TECHNICAL INFORMATION REPORT

For

Front Street Short Plat
9XX Front Street South
Issaquah, WA 98027

December 9, 2022

Prepared by:
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Encompass Engineering Job No. 22679

Prepared For:

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I. PROJECT OVERVIEW

Project:	Front Street Short Plat
Site Address:	9XX Front Street S Issaquah, WA 98027
King County Tax Parcel:	342406-9301
Site Area:	54,450 SF (1.25 AC)
Zoning District:	SF-S Single Family Suburban – 4.5 DU/Acre

Figure 1: Vicinity Map

The proposed project is located along Front Street S in the City of Issaquah. The 54,450 SF (1.25 AC) parcel is undeveloped and forested. The eastern portion of the site contains localized high points, a small depression, and generally slopes off-site to the north. The western portion of the site contains steep slopes to the southwest of up to 50%. The southwestern corner of the site contains a Category 1 Wetland which drains towards Issaquah creek to the west. The site is bordered to the north by a forested access easement, to the south by single-family residential lots, and to the east by Front Street S. The project proposes a three-lot short plat accessed by a shared driveway connecting to Front Street S. Stormwater from the developed site will be dispersed or collected and conveyed to the city storm system.

II. EXISTING CONDITIONS SUMMARY AND SITE ANALYSIS

The existing and proposed site conditions are described in detail below:

Existing Conditions:
This project is located in the City of Issaquah on a 54,450 SF (1.25 AC) irregularly shaped parcel that is zoned as residential SF-S Single Family Suburban (4.5 DU/Acre). The site is undeveloped and forested, with varied topography on the eastern side of the site and steep slopes on the western side of the site of up to 50%.

Critical Areas:
Per the Wetland Delineation by Altmann Oliver, a Category 1 Wetland with a 150-foot buffer is located in the southwest corner of the site. The western portion of the site also contains a Steep Slope Hazard Area with slopes of over 40%, as well as the FEMA 100-year floodplain with a base flood elevation of 121'. The project is also located within a Class 2 & 3 Critical Aquifer Recharge Area and a wellhead protection zone per the City of Issaquah.

Soils:
Per the US Department of Agriculture (USDA), Natural Resources Conservation Service (NCRCS) Web Soil Survey (WSS) information, the project site is underlain with Everett and Briscot soils (See Figure 2 below). Soils encountered from field explorations by the Riley Group consisted of stiff to very stiff silt with some sand over medium dense gravelly silty sand and sandstone. Based on these soil findings, infiltration is not recommended per the Geotechnical Engineering Report included as Appendix A.

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Br	Briscot silt loam	0.3	15.6%
EvB	Everett very gravelly sandy loam, 0 to 8 percent slopes	1.6	84.4%
Totals for Area of Interest		**1.9**	**100.0%**

Figure 2: Soils Map and Legend

Developed Site Conditions:
The project proposes the development of three new single-family lots within the 54,450 SF (1.25 AC) parcel. A critical areas tract will be located on the western portion of the site and contains the Category 1 Wetland and Steep Slope Hazard Area. A 10-foot wide ROW dedication tract will be located on the eastern frontage of the site along Front Street S. The total proposed impervious areas include 3,800 SF of rooftop for three total residences, 3,516 SF of concrete driveway, and 119 SF of off-site concrete driveway. The total proposed impervious surface is 7,435 SF. The remainder of the cleared areas will be replanted as grass lawn and landscaping areas.

The site is zoned SF-S – Single Family Suburban, which allows for a maximum impervious surface coverage of 40%. The proposed impervious areas on each of the three new lots meet this requirement.

Stormwater from rooftop areas on Lots 2 & 3 are proposed to be collected via roof downspouts and conveyed to a gravel filled full dispersion trench. The remainder of the impervious areas will be collected and conveyed to the municipal storm system located on Front St S.

Site Analysis Conditions:
This project proposes to meet the requirements detailed in the 2019 Washington State Department of Ecology Stormwater Manual for Western Washington (SMMWW) and the City of Issaquah 2022 Stormwater Design Manual Addendum. Per Figure 2-2 of the City of Issaquah Addendum (shown as Figure 3 on the following pages), all minimum requirements apply to the new and replaced hard surfaces and converted vegetation areas on site. A summary of the minimum requirements is provided on the following page:

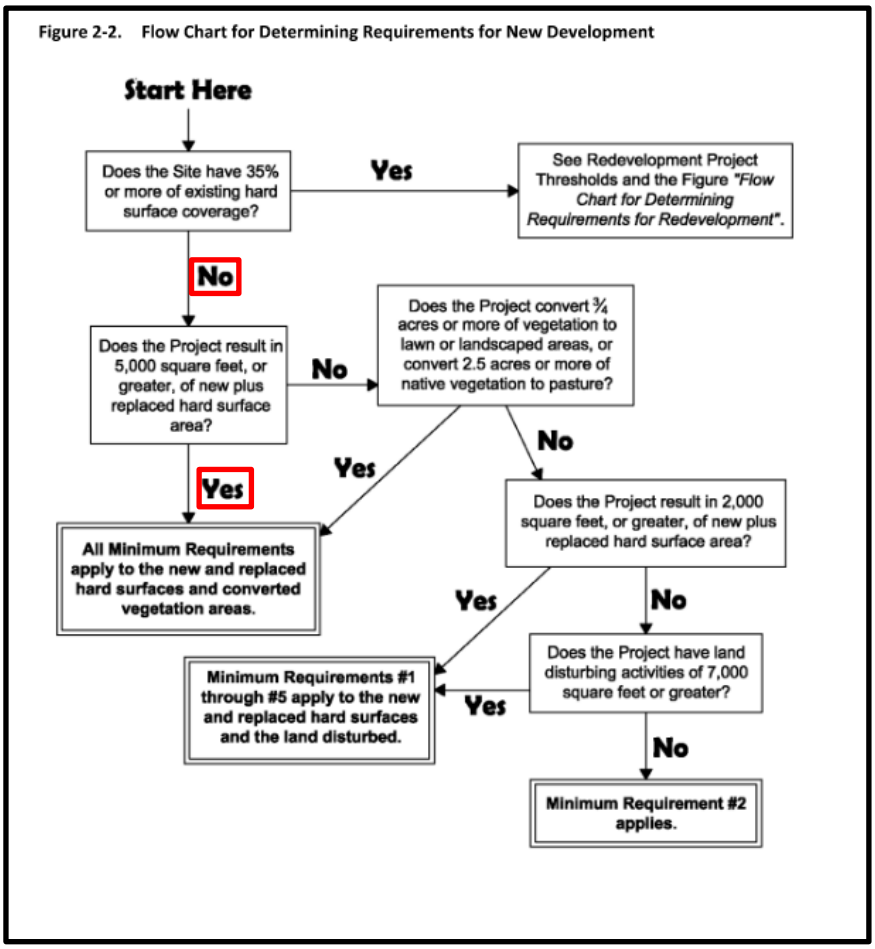

Figure 3: Drainage Review Flow Chart

Minimum Requirement #1: Preparation of Stormwater Site Plans
This Technical Information Report (TIR) has been prepared to satisfy Minimum Requirement #1.

Minimum Requirement #2: Construction Stormwater Pollution Prevention Plan (CSWPPP)
A Temporary Erosion and Sediment Control (TESC) Plan for Construction Activities has been prepared for this project and submitted with the Civil Plans. A Construction Stormwater Pollution Prevention Plan will be completed and submitted with final engineering.

Minimum Requirement #3: Source Control of Pollution
Source Control BMPs will be implemented per Volume IV-1 of the 2019 SWMMWW. The following BMPs have been selected for this residential project:

- *S453 BMPs for Formation of a Pollution Prevention Team*- The Pollution Prevention Team will consist of the Contractor, Owner and Engineer. See the SWPPP (submitted under separate cover) for additional information on this team.
- *S454 BMPs for Preventive Maintenance/Good Housekeeping*- These BMPs will be implemented and maintained during the construction of this project.
- *S455 BMPs for Spill Prevention and Cleanup*- These BMPs will be implemented and maintained during the construction of this project.

Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls

Runoff from the proposed development will follow existing drainage patterns. In the existing condition, stormwater runoff leaves the site in two natural discharge locations along the north and western limits of the site and ultimately enters Issaquah Creek which is approximately 400 feet west of the site. Rooftop areas from Lots 2 & 3 will disperse towards the on-site wetland, while the remainder of the runoff from impervious areas will enter the city of Issaquah municipal storm system which eventually discharges into Issaquah Creek. New pervious areas will follow existing drainage patterns.

Minimum Requirement #5: On-Site Stormwater Management

List #2 in Section 2.4.5 of the Issaquah Addendum was used to select on-site stormwater BMPs for projects triggering Minimum Requirements #1 through #9. See Section IV of this TIR for more information on how these facilities were selected and sized.

Minimum Requirement #6: Runoff Treatment

Proposed pollution generating impervious surfaces (PGIS) on the project site total 3,635 SF. This is less than the 5,000 SF threshold for water quality treatment; therefore, runoff treatment is not included in the proposed improvements.

Minimum Requirement #7: Flow Control

Per Table 1-3 of the 2022 Issaquah Stormwater Design Manual Addendum, if a Threshold Discharge Area (TDA) has an effective impervious surface of >10,000 SF, ¾ acres of vegetation converted to lawn or landscape, or a 0.15 CFS or greater increase in the 100-year flow frequency, Flow Control BMPs are required. This project does not exceed these thresholds, and therefore does not propose any Flow Control BMPs. Stormwater runoff will utilize a combination of on-site stormwater BMPs and a designed tightlined drainage system.

Minimum Requirement #8: Wetlands Protection

A Category 1 Wetland has been identified on the western portion of the site per Wetland Delineation by Altmann Oliver dated February 16, 2022. This wetland has a 150-foot buffer and 15-foot BSBL. The proposed residences and driveway are located outside of these areas. A dispersion trench will be located within the outer 25% of the wetland buffer.

Minimum Requirement #9: Operations and Maintenance

An Operation and Maintenance Manual is included as Appendix E.

III. OFF-SITE ANALYSIS

In accordance with section 1.2.3.1 of the City of Issaquah 20122 Stormwater Design Manual Addendum and section I-3.5.3 of the 2019 SMMWW, an off-site analysis was performed on Tuesday, November 15, 2022 at 12:00 pm. The weather was 45 degrees and sunny in moderately wet conditions.

Task 1: Define and Map the Study Area

This site is contained within the Issaquah Creek Drainage Basin in the Sammamish River Watershed. The area of analysis extends from the site discharge points along the north and west limits of the site to approximately a quarter-mile downstream where stormwater runoff enters Issaquah Creek. A Downstream Map is provided in Figure 4 below. The site contains two Natural Discharge Areas which combine in under ¼ mile downstream, creating a single Threshold Discharge Area (TDA) for the site.

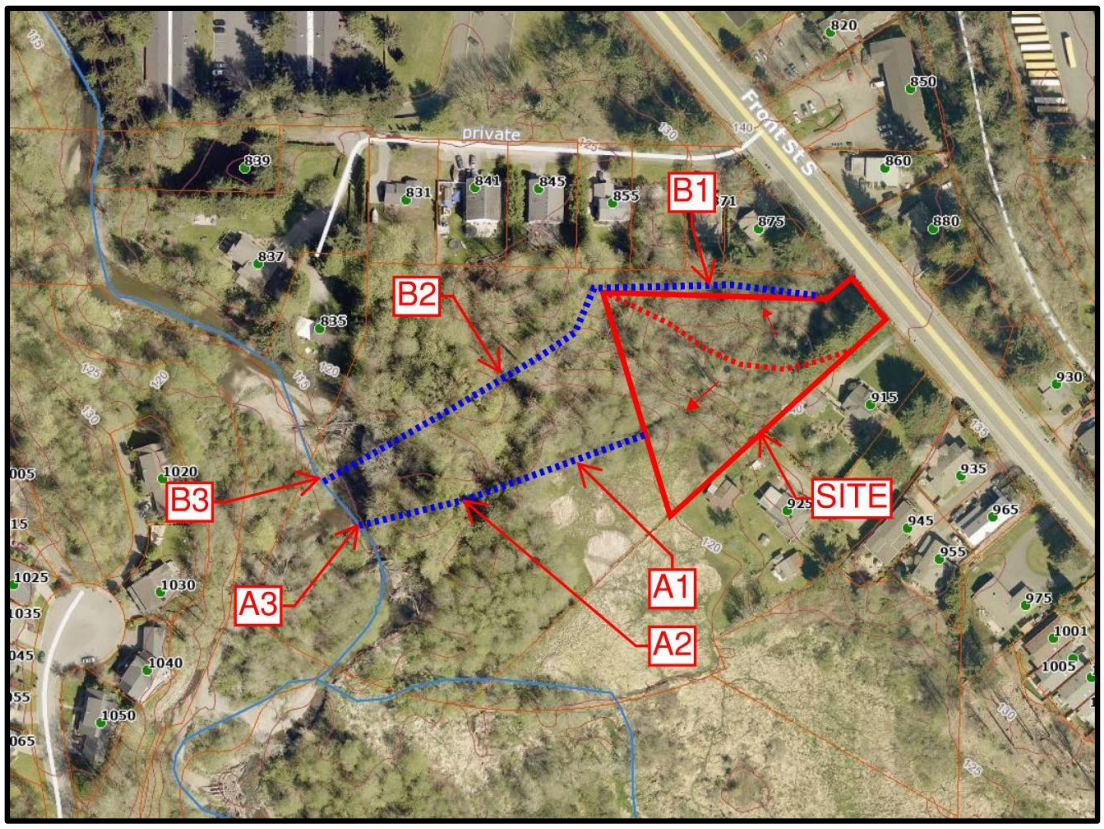

Figure 4: Downstream Map

Task 2: Review All Available Information on the Study Area

Per King County iMap, there have been no recent significant drainage complaints within a quarter-mile downstream of the site. A Category 1 Wetland is located in the southwest corner of the site. The western portion of the site also contains a Steep Slope Hazard Area with slopes of over 40%, as well as the FEMA 100-year floodplain with a base flood elevation of 121'. The project is also located within a Class 2 & 3 Critical Aquifer Recharge Area and a wellhead protection zone per the City of Issaquah.

Task 3: Field Inspect the Study Area

A field inspection was performed by Encompass Engineering & Surveying on Tuesday, November 15, 2022. The site review occurred at 10:00 am under sunny conditions with a temperature of about 44 degrees.

Soils were observed to be wet. Please refer to Task 4 for a detailed description of the downstream drainage system and analysis.

Task 4: Describe the Drainage System and its existing and predicted problems

Runoff from TDA B on the eastern portion of the site generally sheet flows over forested areas to the north, where a forested ravine (B1) located within an access easement conveys stormwater downhill to the west. Stormwater enters a wetland area at the bottom of the hill (B2) which drains towards Issaquah Creek (B3) to the west.

Runoff from TDA A on the western portion of the site sheet flows to the west over steep forested slopes towards a Category 1 Wetland (A1). This wetland drains/sheet flows to the west over forested terrain (A2) where it enters Issaquah Creek (A3) and converges with stormwater from TDA B. Due to restricted access of these areas, aerial photography, topographic maps, and iMap contours were used to determine approximate drainage patterns near Issaquah Creek. No downstream drainage problems were identified.

IV. PERMANENT STORMWATER CONTROL PLAN

The project proposes the development of three new single-family lots within the 54,450 SF (1.25 AC) parcel. The total proposed impervious areas include 3,800 SF of rooftop, 3,516 SF of driveway, and 119 SF of off-site driveway. The total proposed impervious surface is 7,435 SF (0.17 AC). The remainder of the cleared areas will be replanted as grass lawn and landscaping areas. List #2 in Section 2.4.5 of the Issaquah Addendum was used to select on-site stormwater BMPs for projects triggering Minimum Requirements #1 through #9. The selection of BMPs for each surface is summarized below:

Lawn and Landscaped Areas:
Lawn and Landscaped Areas will be controlled using Post-Construction Soil Quality and Depth in accordance with BMP T5.13 in Chapter 5 of Volume V of the SWMMMWW.

Roofs:

1. *Full Dispersion*: Full dispersion is feasible for rooftop areas on Lots 2 & 3. Runoff from 2,800 SF of rooftop area will be collected via downspouts and conveyed to a 40-foot wide gravel-filled dispersion trench w/ notched grade board per BMP T5.10B. This dispersion trench has been sized at 10 LF of trench per 700 SF of rooftop area.
2. *Bioretention:* Infeasible. The underlying soils found in site investigations by Riley Group do not have the capacity to infiltrate stormwater runoff. Additionally, the proposed site plan and surrounding topography does not allow for the use of these facilities.
3. *Downspout Dispersion Systems:* Infeasible. The rooftop area on Lot 1 does not have an adequate flow path for a dispersion system.
4. *Perforated Stub-out Connections:* Infeasible. The underlying soils found in site investigations by Riley Group do not have the capacity to infiltrate stormwater runoff.

Other Hard Surfaces:

1. *Full Dispersion*: The driveway area does not have an adequate 100-foot flowpath for dispersion.
2. *Permeable Pavement*: Infeasible. The underlying soils found in site investigations by Riley Group do not have the capacity to infiltrate stormwater runoff.
3. *Bioretention:* Infeasible. The underlying soils found in site investigations by Riley Group do not have the capacity to infiltrate stormwater runoff. Additionally, the proposed site plan and surrounding topography does not allow for the use of these facilities.
4. *Sheet Flow Dispersion:* Infeasible. Slopes adjacent to the driveway are too steep or do not provide an adequate flow path for dispersion.

Developed Site Hydrology
Of the total 7,435 SF of impervious surfaces, 2,800 of roof area is proposed to be fully dispersed. As no BMPs are feasible for the remaining 4,635 SF of impervious area, these areas will be tightlined via an on-site stormwater system to the city stormwater system on Front St S. Approximately 17,253 SF will be cleared and graded for this project. Pervious areas will be replanted as grass or landscaping. WWHM was used to model these areas, with fully dispersed areas modeled as forest in the developed condition per Runoff Model Representation in BMP T5.30. This project results in a 0.147 CFS increase in the 100-year flows, which is less than the Flow Control threshold of 0.15 CFS. A Summary of the modeled areas is shown below, and the WWHM output is included as Appendix D.

On-site + Off-Site	Existing		Proposed	
Condition	Measured	Modeled	Measured	Modeled
Forest, Moderate:	17,253 SF (0.37 AC)	17,253 SF (0.37 AC)		
Forest, Flat:				2,800 SF (0.06 AC)
Driveway, Moderate:			3,516 SF (0.08 AC)	3,516 SF (0.08 AC)
Lawn, Flat:			3,920 SF (0.09 AC)	3,920 SF (0.09 AC)
Lawn, Moderate:			5,709 SF (0.12 AC)	5,709 SF (0.12 AC)
Roof, Flat:			3,800 SF (0.08 AC)	1,000 SF (0.02 AC)
Total Area:	17,253 SF (0.37 AC)	17,253 SF (0.37 AC)	17,253 SF (0.37 AC)	17,253 SF (0.37 AC)

V. CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

A full SWPPP will be prepared and submitted with Final Engineering.

I. SPECIAL REPORTS AND STUDIES

- Geotechnical Engineering Report by The Riley Group dated September 14, 2022
- Wetland Delineation Report by Altmann Oliver dated February 16, 2022
- Arborist Report by Tree Frog LLC dated September 9, 2022

VII. OTHER PERMITS

- Building permits

VIII. OPERATION AND MAINTENANCE MANUAL

An Operation and Maintenance Manual is included as Appendix E.

IX. DECLARATION OF COVENANT OR EASEMENT FOR PRIVATELY MAINTAINED FLOW CONTROL AND TREATMENT FACILITIES

This document will be prepared and submitted upon plan approval if required.

X. DECLARATION OF COVENANT OR EASEMENT FOR ON-SITE STORMWATER MANAGEMENT FACILITIES

This document will be prepared and submitted upon plan approval if required.

XI. BOND QUANTITIES WORKSHEET

This document will be prepared and submitted if required.

Appendix A

Geotechnical Report by The Riley Group dated September 14, 2022

GEOTECHNICAL ENGINEERING REPORT

PREPARED BY:

THE RILEY GROUP, INC.
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BOTHELL, WASHINGTON 98011

PREPARED FOR:

VAMSHI PRIYA AND KRANTHI BATHULA
4804 243RD CIRCLE SOUTHEAST
SAMMAMISH, WASHINGTON 98029

RGI PROJECT NO. 2022-501-1

PRIYA/BATHULA 3-LOT SHORT PLAT
8XX FRONT STREET SOUTH
ISSAQUAH, WASHINGTON

SEPTEMBER 14, 2022

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RILEYGROUP

September 14, 2022

Vamshi Priya and Kranthi Bathula
4804 243rd Circle Southeast
Sammamish, Washington 98029

Subject: **Geotechnical Engineering Report**
Priya/Bathula 3-Lot Short Plat
8XX Front Street South
Issaquah, Washington
RGI Project No. 2022-501-1

Dear Vamshi Priya and Kranthi Bathula:

As requested, The Riley Group, Inc. (RGI) has performed a Geotechnical Engineering Report (GER) for the Priya/Bathula 3-Lot Short Plat located at 8XX Front Street South, Issaquah, Washington. Our services were completed in accordance with our proposal dated August 15, 2022 and authorized by Kranthi Bathula on August 18, 2022. The information in this GER is based on our understanding of the proposed construction, and the soil and groundwater conditions encountered in the test pits completed by RGI at the site on August 26, 2022.

RGI recommends that you submit the project plans and specifications to RGI for a general review so that we may confirm that the recommendations in this GER are interpreted and implemented properly in the construction documents. RGI also recommends that a representative of our firm be present on site during portions of the project construction to confirm that the soil and groundwater conditions are consistent with those that form the basis for the engineering recommendations in this GER.

If you have any questions or require additional information, please contact us.

Respectfully submitted,

THE RILEY GROUP, INC.

KRISTINA MARIE WELLER
STATE OF WASHINGTON
33182
REGISTERED
PROFESSIONAL ENGINEER

9/14/22

Eric L. Woods, LG
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Executive Summary

This Executive Summary should be used in conjunction with the entire Geotechnical Engineering Report (GER) for design and/or construction purposes. It should be recognized that specific details were not included or fully developed in this section, and the GER must be read in its entirety for a comprehensive understanding of the items contained herein. Section 7.0 should be read for an understanding of limitations.

RGI's geotechnical scope of work included the advancement of three test pits to approximate depths of 7.5 to 10 feet below existing site grades.

Based on the information obtained from our subsurface exploration, the site is suitable for development of the proposed project. The following geotechnical considerations were identified:

Soil Conditions: The soils encountered during field exploration include stiff to very stiff silt with some sand over medium dense gravelly silty sand and sandstone.

Groundwater: No groundwater seepage was encountered during our subsurface exploration.

Foundations: Foundations for the proposed building may be supported on conventional spread footings bearing on medium dense to dense native soil or structural fill.

Slab-on-grade: Slab-on-grade floors and slabs for the proposed building can be supported on medium dense to dense native soil or structural fill.

1.0 Introduction

This Geotechnical Engineering Report (GER) presents the results of the geotechnical engineering services provided for the Priya/Bathula 3-Lot Short Plat in Issaquah, Washington. The purpose of this evaluation is to assess subsurface conditions and provide geotechnical recommendations for the construction of three single family residences at the site. Our scope of services included field explorations, laboratory testing, engineering analyses, and preparation of this GER.

The recommendations in the following sections of this GER are based upon our current understanding of the proposed site development as outlined below. If actual features vary or changes are made, RGI should review them in order to modify our recommendations as required. In addition, RGI requests to review the site grading plan, final design drawings and specifications when available to verify that our project understanding is correct and that our recommendations have been properly interpreted and incorporated into the project design and construction.

2.0 Project description

The project site is located at 8XX Front Street South in Issaquah, Washington. The approximate location of the site is shown on Figure 1.

The site is currently an undeveloped, forested lot. RGI understands that the site will be short platted and three single family residences will be constructed on the site.

At the time of preparing this GER, building plans were not available for our review. Based on our experience with similar construction, RGI anticipates that the proposed building will be supported on perimeter walls with bearing loads of two to six kips per linear foot. Slab-on-grade floor loading of 150 pounds per square foot (psf) are expected.

3.0 Field Exploration and Laboratory Testing

3.1 Field Exploration

On August 26, 2022, RGI observed the excavation of three test pits. The approximate exploration locations are shown on Figure 2.

Field logs of each exploration were prepared by the geologist that continuously observed the excavation. These logs included visual classifications of the materials encountered during excavation as well as our interpretation of the subsurface conditions between samples. The test pit logs included in Appendix A represent an interpretation of the field logs and include modifications based on laboratory observation and analysis of the samples.

3.2 LABORATORY TESTING

During the field exploration, a representative portion of each recovered sample was sealed in containers and transported to our laboratory for further visual and laboratory examination. Selected samples retrieved from the test pits were tested for moisture content and grain size analysis to aid in soil classification and provide input for the recommendations provided in this GER. The results and descriptions of the laboratory tests are enclosed in Appendix A.

4.0 Site Conditions

4.1 SURFACE

The subject site is an irregular-shaped parcel of land approximately 1.25 acres in size. The site is bound to the north by a forested access easement, to the west by undeveloped forest, to the south by single-family residences, and to the east by Front Street South.

The existing site is vacant land covered by trees and other vegetation. The site slopes north and southwest from a topographic high in the central portion of the property, with a total elevation change of about 25 feet across the site. Slope gradients are generally in the range of 5 to 20 percent in the eastern portion of the property, increasing to about 35 to 50 on the southwest-facing slope in the western portion of the property. The southwestern corner of the site at the toe of the slope is relatively level and contains a wetland.

4.2 GEOLOGY

Review of the *Geologic Map of the East Half of the Bellevue South 7.5' x 15' Quadrangle, Issaquah Area, King County, Washington,* by Derek B. Booth, etc. (2012) indicates that the soil in the project vicinity is mapped as Recessional outwash deposits – Stage 5 (Map Unit Qvr_5), which is stratified sand and gravel, and silty sand and silt deposited in outwash channels during ice recession. These descriptions are generally similar to the soils encountered in our field explorations. The sandstone encountered at Test Pit TP-2 appears to match the description for either Renton Formation (Tpr) or Tukwila Formation (Tpt), both mapped to the west of the site.

4.3 SOILS

The soils encountered during field exploration include stiff to very stiff silt with some sand over medium dense gravelly silty sand and sandstone.

More detailed descriptions of the subsurface conditions encountered are presented in the test pit logs included in Appendix A. Sieve analysis was performed on three selected soil samples. Grain size distribution curves are included in Appendix A.

4.4 GROUNDWATER

No groundwater seepage was encountered during our subsurface exploration.

It should be recognized that fluctuations of the groundwater table will occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the explorations were performed. In addition, perched water can develop within seams and layers contained in fill soils or higher permeability soils overlying less permeable soils following periods of heavy or prolonged precipitation. Therefore, groundwater levels during construction or at other times in the future may be higher or lower than the levels indicated on the logs. Groundwater level fluctuations should be considered when developing the design and construction plans for the project.

4.5 SEISMIC CONSIDERATIONS

Based on the International Building Code (IBC), RGI recommends the follow seismic parameters for design.

Table 1 IBC

Parameter	2018 Value
Site Soil Class[1]	D[2]
Site Latitude	47.5200
Site Longitude	-122.0325
Short Period Spectral Response Acceleration, S_S (g)	1.303
1-Second Period Spectral Response Acceleration, S_1 (g)	0.449
Adjusted Short Period Spectral Response Acceleration, S_{MS} (g)	1.303
Adjusted 1-Sec Period Spectral Response Acceleration, S_{M1} (g)	0.831[3]
Numeric seismic design value at 0.2 second; S_{DS}(g)	0.869
Numeric seismic design value at 1.0 second; S_{D1}(g)	0.554[3]

1. Note: In general accordance with Chapter 20 of ASCE 7-16. The Site Class is based on the average characteristics of the upper 100 feet of the subsurface profile.

2. Note: ASCE 7-16 require a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope of our services does not include the required 100 foot soil profile determination. Test pits extended to a maximum depth of 10 feet, and this seismic site class definition considers that similar soil continues below the maximum depth of the subsurface exploration. Additional exploration to deeper depths would be required to confirm the conditions below the current depth of exploration.

3. Note: In accordance with ASCE 11.4.8, a ground motion hazard analysis is not required for the following cases:

- Structures on Site Class E sites with S_S greater than or equal to 1.0, provided the site coefficient Fa is taken as equal to that of Site Class C.
- Structures on Site Class D sites with S_1 greater than or equal to 0.2, provided that the value of the seismic response coefficient Cs is determined by Eq. 12.8-2 for values of T ≤ 1.5Ts and taken as equal to 1.5 times the value computed in accordance with either Eq. 12.8-3 for $T_L \geq T > 1.5T_s$ or Eq. 12.8-4 for T > TL.
- Structures on Site Class E sites with S_1 greater than or equal to 0.2, provided that T is less than or equal to T_s and the equivalent static force procedure is used for design.

The above exceptions do not apply to seismically isolated structures, structures with damping systems or structures designed using the response history procedures of Chapter 16.

Liquefaction is a phenomenon where there is a reduction or complete loss of soil strength due to an increase in water pressure induced by vibrations from a seismic event. Liquefaction mainly affects geologically recent deposits of fine-grained sands that are below the groundwater table. Soils of this nature derive their strength from intergranular friction. The generated water pressure or pore pressure essentially separates the soil grains and eliminates this intergranular friction, thus reducing or eliminating the soil's strength.

RGI reviewed the results of the field and laboratory testing and assessed the potential for liquefaction of the site's soil during an earthquake. Since the site is underlain by medium dense and very stiff deposits and lacks an established shallow groundwater table, RGI considers that the possibility of liquefaction during an earthquake is low.

4.6 GEOLOGIC HAZARD AREAS

Regulated geologically hazardous areas include erosion, landslide, earthquake, or other geological hazards. Based on the definitions in the Issaquah Municipal Code (IMC), portions of the site meet the criteria of Landslide Hazard Areas and Steep Slope Hazard Areas.

4.6.1 COAL MINE HAZARD AREAS

Review of the Washington State DNR Coal Mine Map Collection shows the entrances to Bagley No. 1 and No. 2 seams and the May Creek seam were located about 1,800 feet west-northwest of the site and the entrance to the Jones seam was about 1,000 feet west of the site. Mine workings at these coal mines extended west from the entrances. No coal mine workings were mapped below the site, and the site is not considered a Coal Mine Hazard Area.

4.6.2 EROSION HAZARD AREAS

Review of the *Soil Survey of King County Area Washington* by the USDA Soil Conservation Service (1973) indicates the western portion of the site is mapped as Briscott silt loam (Br) and the eastern portion of the site is mapped as Everett gravelly sandy loam, 0 to 5 percent slopes (EvB). Both soils have a slight erosion hazard potential and are not considered an Erosion Hazard Area.

4.6.3 LANDSLIDE AND STEEP SLOPE HAZARD AREAS

Review of definitions in the IMC indicates that some of the site slopes meet the criteria of a Landslide Hazard Area and Steep Slope Hazard Area due to having slopes greater that 40 percent. Reconnaissance of the slopes showed that they are well vegetated with no signs of recent slide activity. The slopes are 20 feet or less in height and are located within a 150 foot wetland buffer. The slopes are more than 50 feet away from the proposed development. The proposed development is adequately set back from the slopes to pose no hazard to the development or neighboring properties.

4.6.4 SEISMIC HAZARD AREAS

As discussed in Section 4.5 of this report, since the site is underlain by medium dense and very stiff deposits and lacks an established shallow groundwater table, RGI considers that the possibility of liquefaction during an earthquake is low. The site is not considered a Seismic Hazard Area.

5.0 Discussion and Recommendations

5.1 GEOTECHNICAL CONSIDERATIONS

Based on our study, the site is suitable for the proposed construction from a geotechnical standpoint. Foundations for the proposed building can be supported on conventional spread footings bearing on competent native soil or structural fill. Slab-on-grade floors can be similarly supported.

Detailed recommendations regarding the above issues and other geotechnical design considerations are provided in the following sections. These recommendations should be incorporated into the final design drawings and construction specifications.

5.2 EARTHWORK

The earthwork is expected to include excavating and backfilling the building foundations and preparing slab subgrades.

5.2.1 EROSION AND SEDIMENT CONTROL

Potential sources or causes of erosion and sedimentation depend on construction methods, slope length and gradient, amount of soil exposed and/or disturbed, soil type, construction sequencing and weather. The impacts on erosion-prone areas can be reduced by implementing an erosion and sedimentation control plan. The plan should be designed in accordance with applicable city and/or county standards.

RGI recommends the following erosion control Best Management Practices (BMPs):

- Scheduling site preparation and grading for the drier summer and early fall months and undertaking activities that expose soil during periods of little or no rainfall
- Retaining existing vegetation whenever feasible
- Establishing a quarry spall construction entrance
- Installing siltation control fencing or anchored straw or coir wattles on the downhill side of work areas
- Covering soil stockpiles with anchored plastic sheeting
- Revegetating or mulching exposed soils with a minimum 3-inch thickness of straw if surfaces will be left undisturbed for more than one day during wet weather or one week in dry weather

- Directing runoff away from exposed soils and slopes
- Minimizing the length and steepness of slopes with exposed soils and cover excavation surfaces with anchored plastic sheeting
- Decreasing runoff velocities with check dams, straw bales or coir wattles
- Confining sediment to the project site
- Inspecting and maintaining erosion and sediment control measures frequently (The contractor should be aware that inspection and maintenance of erosion control BMPs is critical toward their satisfactory performance. Repair and/or replacement of dysfunctional erosion control elements should be anticipated.)

Permanent erosion protection should be provided by reestablishing vegetation using hydroseeding and/or landscape planting. Until the permanent erosion protection is established, site monitoring should be performed by qualified personnel to evaluate the effectiveness of the erosion control measures. Provisions for modifications to the erosion control system based on monitoring observations should be included in the erosion and sedimentation control plan.

5.2.2 Stripping and Subgrade Preparation

Stripping efforts should include removal of pavements, vegetation, organic materials, and deleterious debris from areas slated for building, pavement, and utility construction. The test pits encountered 6 to 12 inches of topsoil and rootmass. Deeper areas of stripping may be required in heavily vegetated areas of the site.

Subgrade soils that become disturbed due to elevated moisture conditions should be overexcavated to reveal firm, non-yielding, non-organic soils and backfilled with compacted structural fill. In order to maximize utilization of site soils as structural fill, RGI recommends that the earthwork portion of this project be completed during extended periods of warm and dry weather if possible. If earthwork is completed during the wet season (typically November through May) it will be necessary to take extra precautionary measures to protect subgrade soils. Wet season earthwork will require additional mitigative measures beyond that which would be expected during the drier summer and fall months.

5.2.3 Excavations

All temporary cut slopes associated with the site and utility excavations should be adequately inclined to prevent sloughing and collapse. The site soils consist of stiff to very stiff silt with some sand and medium dense silty gravelly sand.

Accordingly, for excavations more than 4 feet but less than 20 feet in depth, the temporary side slopes should be laid back with a minimum slope inclination of 1H:1V (Horizontal:Vertical). If there is insufficient room to complete the excavations in this manner, or excavations greater than 20 feet in depth are planned, using temporary shoring

to support the excavations should be considered. For open cuts at the site, RGI recommends:

- No traffic, construction equipment, stockpiles or building supplies are allowed at the top of cut slopes within a distance of at least five feet from the top of the cut
- Exposed soil along the slope is protected from surface erosion using waterproof tarps and/or plastic sheeting
- Construction activities are scheduled so that the length of time the temporary cut is left open is minimized
- Surface water is diverted away from the excavation
- The general condition of slopes should be observed periodically by a geotechnical engineer to confirm adequate stability and erosion control measures

In all cases, however, appropriate inclinations will depend on the actual soil and groundwater conditions encountered during earthwork. Ultimately, the site contractor must be responsible for maintaining safe excavation slopes that comply with applicable OSHA or WISHA guidelines.

5.2.4 STRUCTURAL FILL

RGI recommends fill below the foundation and floor slab, behind retaining walls, and below pavement and hardscape surfaces be placed in accordance with the following recommendations for structural fill. The structural fill should be placed after completion of site preparation procedures as described above.

The suitability of excavated site soils and import soils for compacted structural fill use will depend on the gradation and moisture content of the soil when it is placed. As the amount of fines (that portion passing the U.S. No. 200 sieve) increases, soil becomes increasingly sensitive to small changes in moisture content and adequate compaction becomes more difficult or impossible to achieve. Soils containing more than about 5 percent fines cannot be consistently compacted to a dense, non-yielding condition when the moisture content is more than 2 percent above or below optimum. Optimum moisture content is that moisture that results in the greatest compacted dry density with a specified compactive effort.

Non-organic site soils are only considered suitable for structural fill provided that their moisture content is within about two percent of the optimum moisture level as determined by American Society of Testing and Materials D1557-09 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (ASTM D1557). Excavated site soils may not be suitable for re-use as structural fill depending on the moisture content and weather conditions at the time of construction. If soils are stockpiled for future reuse and wet weather is anticipated, the stockpile should be protected with plastic sheeting that is securely anchored. Even during dry weather, moisture conditioning (such as, windrowing and drying) of site soils to be reused as structural fill may be required.

The site soils are moisture sensitive and may require moisture conditioning prior to use as structural fill. If on-site soils are or become unusable, it may become necessary to import suitable soils for structural fill.

Prior to use, an RGI representative should observe and test all materials imported to the site for use as structural fill. Structural fill materials should be placed in uniform loose layers not exceeding 12 inches and compacted to 95 percent of the maximum dry density. The soil's maximum density and optimum moisture should be determined by ASTM D1557. Placement and compaction of structural fill should be observed by RGI.

5.2.5 Wet Weather Construction Considerations

RGI recommends that preparation for site grading and construction include procedures intended to drain ponded water, control surface water runoff, and to collect shallow subsurface seepage zones in excavations where encountered. It will not be possible to successfully compact the subgrade or utilize on-site soils as structural fill if accumulated water is not drained prior to grading or if drainage is not controlled during construction. Attempting to grade the site without adequate drainage control measures will reduce the amount of on-site soil effectively available for use, increase the amount of select import fill materials required, and ultimately increase the cost of the earthwork phases of the project. Free water should not be allowed to pond on the subgrade soils. RGI anticipates that the use of berms and shallow drainage ditches, with sumps and pumps in utility trenches, will be required for surface water control during wet weather and/or wet site conditions.

5.3 Foundations

Following site preparation and grading, the proposed building foundation can be supported on conventional spread footings bearing on competent native soil or structural fill. Loose, organic, or other unsuitable soils may be encountered in the proposed building footprint. If unsuitable soils are encountered, they should be overexcavated and backfilled with structural fill. If loose soils are encountered, the soils should be moisture conditioned and compacted to a firm and unyielding condition.

Table 2 Foundation Design

Design Parameter	Value
Allowable Bearing Capacity	2,000 psf[1]
Friction Coefficient	0.30
Passive pressure (equivalent fluid pressure)	250 pcf[2]

1. psf = pounds per square foot
2. pcf = pounds per cubic foot

The allowable foundation bearing pressures apply to dead loads plus design live load conditions. For short-term loads, such as wind and seismic, a 1/3 increase in this allowable capacity may be used. At perimeter locations, RGI recommends not including the upper 12 inches of soil in the computation of passive pressures because they can be affected by weather or disturbed by future grading activity. The passive pressure value assumes the foundation will be constructed neat against competent soil or backfilled with structural fill as described in Section 5.2.4. The recommended base friction and passive resistance value includes a safety factor of about 1.5.

Perimeter foundations exposed to weather should be at a minimum depth of 18 inches below final exterior grades. Interior foundations can be constructed at any convenient depth below the floor slab. Finished grade is defined as the lowest adjacent grade within 5 feet of the foundation for perimeter (or exterior) footings and finished floor level for interior footings.

With spread footing foundations designed in accordance with the recommendations in this section, maximum total and differential post-construction settlements of 1 inch and 1/2 inch, respectively, should be expected.

5.4 RETAINING WALLS

If retaining walls are needed for the structures, RGI recommends cast-in-place concrete walls be used. Modular block walls may be sued for grade changes in other areas.

The magnitude of earth pressure development on retaining walls will partly depend on the quality of the wall backfill. RGI recommends placing and compacting wall backfill as structural fill. Wall drainage will be needed behind the wall face. A typical retaining wall drainage detail is shown in Figure 3.

With wall backfill placed and compacted as recommended, level backfill and drainage properly installed, RGI recommends using the values in the following table for design.

Table 3 Retaining Wall Design

Design Parameter	Value
Active Earth Pressure (unrestrained walls)	35 pcf
At-rest Earth Pressure (restrained walls)	50 pcf

For seismic design, an additional uniform load of 7 times the wall height (H) for unrestrained walls and 14H in psf for restrained walls should be applied to the wall surface. Friction at the base of foundations and passive earth pressure will provide resistance to these lateral loads. Values for these parameters are provided in Section 5.3.

5.5 SLAB-ON-GRADE CONSTRUCTION

Once site preparation has been completed as described in Section 5.2, suitable support for slab-on-grade construction should be provided. RGI recommends that the concrete slab be placed on top of medium dense native soil or structural fill. Immediately below the floor slab, RGI recommends placing a four-inch thick capillary break layer of clean, free-draining sand or gravel that has less than five percent passing the U.S. No. 200 sieve. This material will reduce the potential for upward capillary movement of water through the underlying soil and subsequent wetting of the floor slab. Where moisture by vapor transmission is undesirable, an 8- to 10-millimeter thick plastic membrane should be placed on a 4-inch thick layer of clean gravel.

For the anticipated floor slab loading, we estimate post-construction floor settlements of 1/4- to 1/2-inch.

5.6 DRAINAGE

5.6.1 SURFACE

Final exterior grades should promote free and positive drainage away from the building area. Water must not be allowed to pond or collect adjacent to foundations or within the immediate building area. For non-pavement locations, RGI recommends providing a minimum drainage gradient of 3 percent for a minimum distance of 10 feet from the building perimeter. In paved locations, a minimum gradient of 1 percent should be provided unless provisions are included for collection and disposal of surface water adjacent to the structure.

5.6.2 SUBSURFACE

RGI recommends installing perimeter foundation drains. A typical footing drain detail is shown on Figure 4. The foundation drains and roof downspouts should be tightlined separately to an approved discharge facility. Subsurface drains must be laid with a gradient sufficient to promote positive flow to a controlled point of approved discharge.

5.6.3 INFILTRATION

Based on the surface conditions encountered, infiltration is not feasible on the site.

5.7 UTILITIES

Utility pipes should be bedded and backfilled in accordance with American Public Works Association (APWA) specifications. For site utilities located within the right-of-ways, bedding and backfill should be completed in accordance with City of Issaquah specifications. At a minimum, trench backfill should be placed and compacted as structural fill, as described in Section 5.2.4. Where utilities occur below unimproved areas, the degree

of compaction can be reduced to a minimum of 90 percent of the soil's maximum density as determined by the referenced ASTM D1557. Soils excavated on site may not be suitable for use as backfill material. Imported structural fill meeting the gradation provided may be necessary for trench backfill.

6.0 Additional Services

RGI is available to provide further geotechnical consultation throughout the design phase of the project. RGI should review the final design and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and incorporated into project design and construction.

RGI is also available to provide geotechnical engineering and construction monitoring services during construction. The integrity of the earthwork and construction depends on proper site preparation and procedures. In addition, engineering decisions may arise in the field in the event that variations in subsurface conditions become apparent. Construction monitoring services are not part of this scope of work. If these services are desired, please let us know and we will prepare a cost proposal.

7.0 Limitations

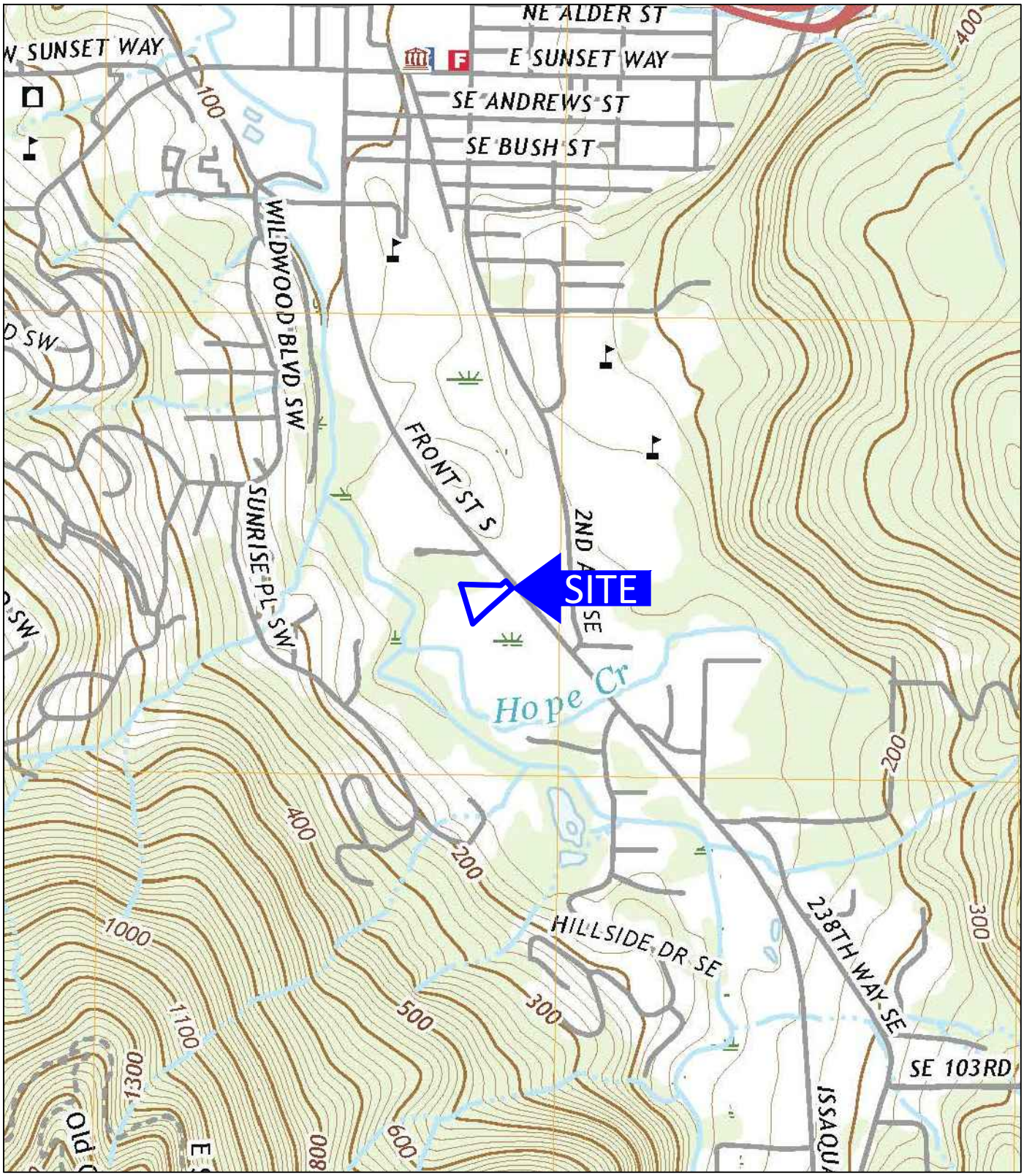
This GER is the property of RGI, Vamshi Priya and Kranthi Bathula, and its designated agents. Within the limits of the scope and budget, this GER was prepared in accordance with generally accepted geotechnical engineering practices in the area at the time this GER was issued. This GER is intended for specific application to the Priya/Bathula 3-Lot Short Plat project in Issaquah, Washington, and for the exclusive use of Vamshi Priya and Kranthi Bathula and its authorized representatives. No other warranty, expressed or implied, is made. Site safety, excavation support, and dewatering requirements are the responsibility of others.

The scope of services for this project does not include either specifically or by implication any environmental or biological (for example, mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, we can provide a proposal for these services.

The analyses and recommendations presented in this GER are based upon data obtained from the explorations performed on site. Variations in soil conditions can occur, the nature and extent of which may not become evident until construction. If variations appear evident, RGI should be requested to reevaluate the recommendations in this GER prior to proceeding with construction.

It is the client's responsibility to see that all parties to the project, including the designers, contractors, subcontractors, are made aware of this GER in its entirety. The use of

information contained in this GER for bidding purposes should be done at the contractor's option and risk.



USGS, 2020, Issaquah, Washington
7.5-Minute Quadrangle

Approximate Scale: 1"=1000'

0 500 1000 2000

N

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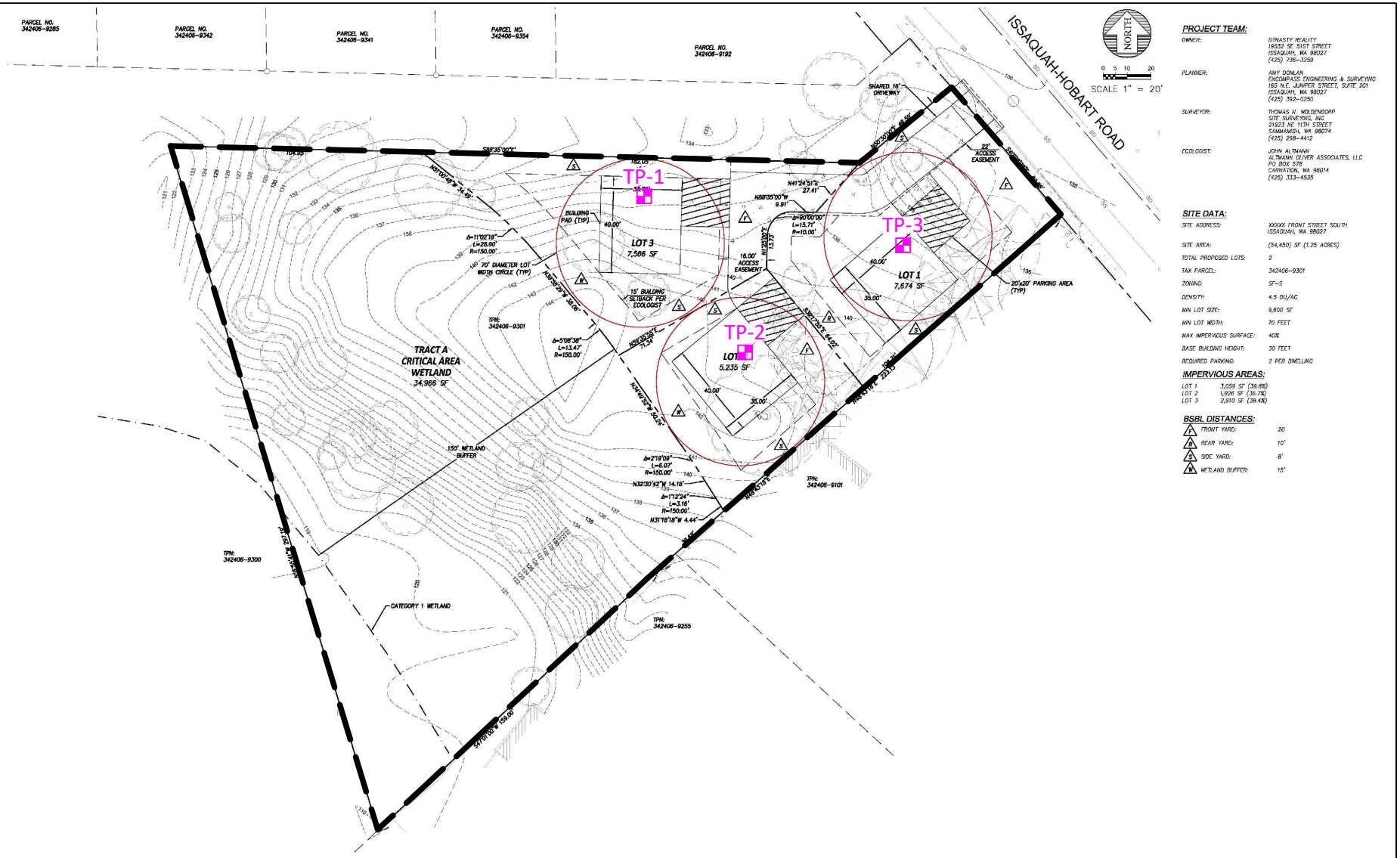
Priya/Bathula 3-Lot Short Plat		Figure 1
RGI Project Number: 2022-501-1	Site Vicinity Map	Date Drawn: 09/2022
Address: 8XX Front Street, Issaquah, Washington 98027		



PROJECT TEAM:

OWNER: DYNASTY REALITY
16532 SE 81ST STREET
ISSAQUAH, WA 98027
(425) 736-3259

PLANNER: AMY DONLAN
ENCOMPASS ENGINEERING & SURVEYING
165 N.E. JUNIPER STREET, SUITE 201
ISSAQUAH, WA 98027
(425) 392-0250

SURVEYOR: THOMAS N. WOLDENDORP
SITE SURVEYING, INC
21923 NE 11TH STREET
SAMMAMISH, WA 98074
(425) 298-4412

ECOLOGIST: JOHN ALTMANN
ALTMANN OLIVER ASSOCIATES, LLC
PO BOX 578
CARNATION, WA 98014
(425) 333-4535

SITE DATA:

SITE ADDRESS:	XXXXX FRONT STREET SOUTH ISSAQUAH, WA 98027
SITE AREA:	(54,450) SF (1.25 ACRES)
TOTAL PROPOSED LOTS:	2
TAX PARCEL:	342406-9301
ZONING:	SF-5
DENSITY:	4.5 DU/AC
MIN LOT SIZE:	9,600 SF
MIN LOT WIDTH:	70 FEET
MAX IMPERVIOUS SURFACE:	40%
BASE BUILDING HEIGHT:	30 FEET
REQUIRED PARKING:	2 PER DWELLING

IMPERVIOUS AREAS:

LOT 1	3,059 SF (39.8%)
LOT 2	1,928 SF (36.7%)
LOT 3	2,910 SF (38.4%)

BSBL DISTANCES:

F	FRONT YARD: 20
R	REAR YARD: 10'
S	SIDE YARD: 8'
W	WETLAND BUFFER: 15'

= Test pit by RGI, 08/26/2022

= Site boundary

Approximate Scale: 1"=60'

0 30 60 120

N

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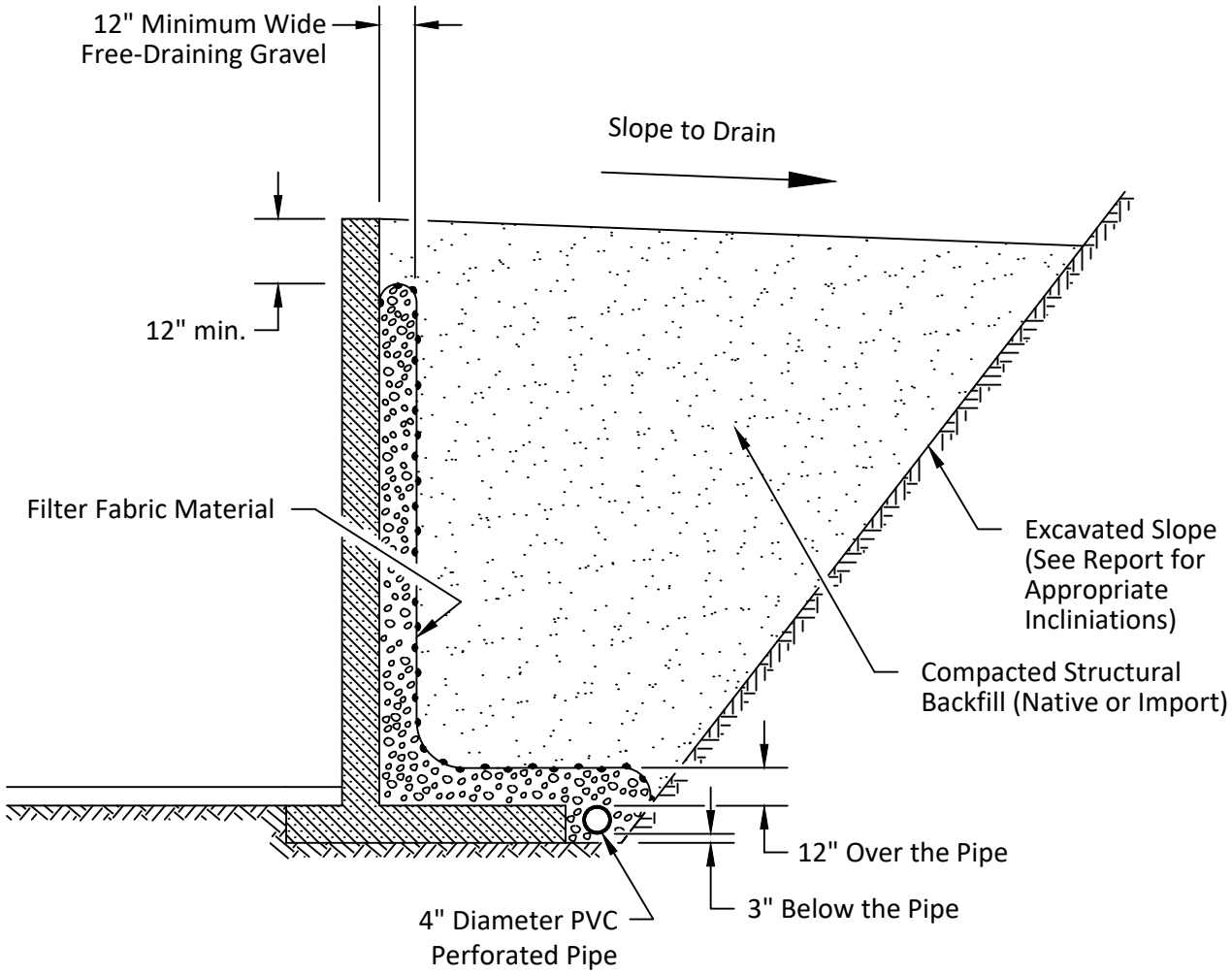
Priya/Bathula 3-Lot Short Plat		Figure 2
RGI Project Number: 2022-501-1	Geotechnical Exploration Plan	Date Drawn: 09/2022
Address: 8XX Front Street, Issaquah, Washington 98027		



Not to Scale

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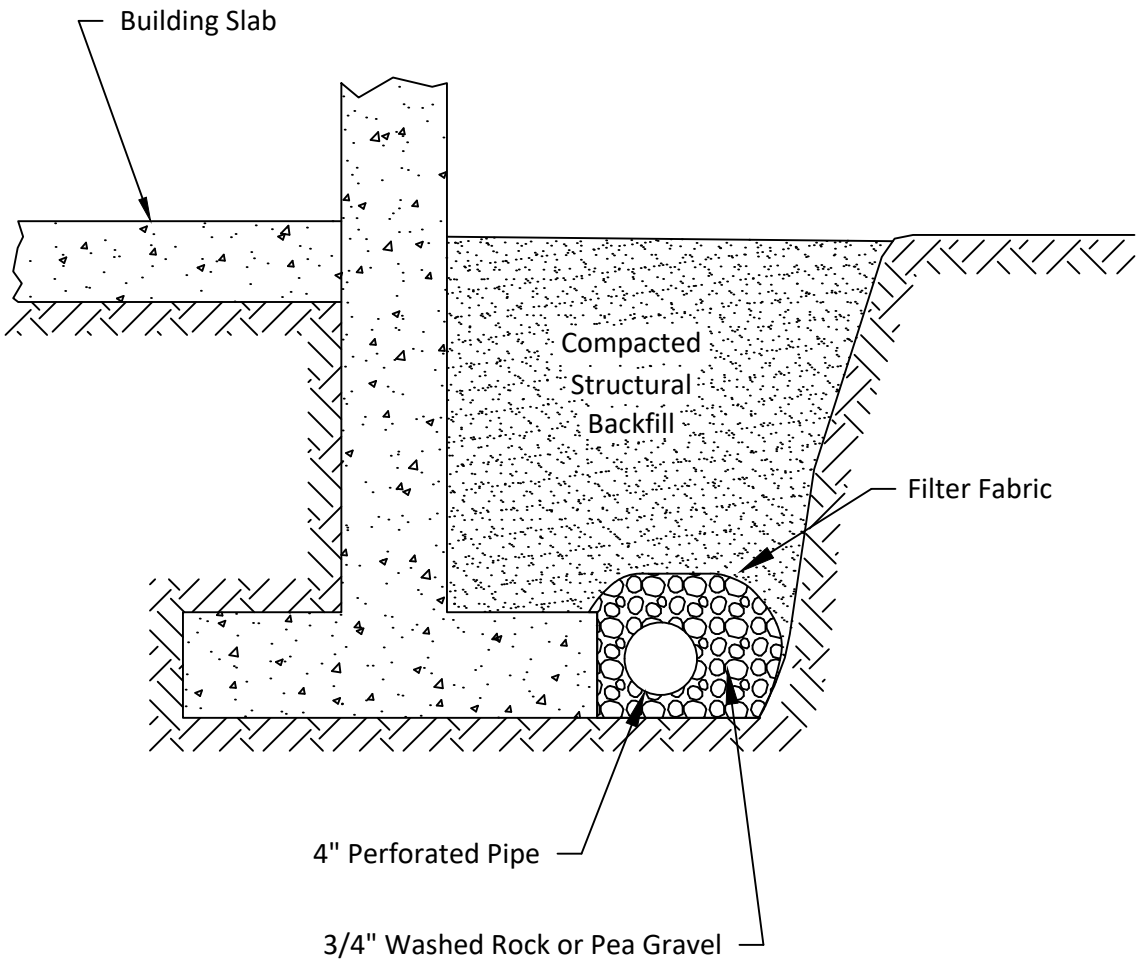
Priya/Bathula 3-Lot Short Plat		Figure 3
RGI Project Number: 2022-501-1	Retaining Wall Drainage Detail	Date Drawn: 09/2022
Address: 8XX Front Street, Issaquah, Washington 98027		



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Priya/Bathula 3-Lot Short Plat		Figure 4
RGI Project Number: 2022-501-1	Typical Footing Drain Detail	Date Drawn: 09/2022
Address: 8XX Front Street, Issaquah, Washington 98027		

APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING

On August 26, 2022, RGI performed field explorations using a mini excavator. We explored subsurface soil conditions at the site by observing the excavation of three test pits to a maximum depth of 10 feet below existing grade. The test pit locations are shown on Figure 2. The test pit locations were approximately determined by measurements from existing property lines and paved roads.

A geologist from our office conducted the field exploration and classified the soil conditions encountered, maintained a log of each test exploration, obtained representative soil samples, and observed pertinent site features. All soil samples were visually classified in accordance with the Unified Soil Classification System (USCS).

Representative soil samples obtained from the explorations were placed in closed containers and taken to our laboratory for further examination and testing. As a part of the laboratory testing program, the soil samples were classified in our in house laboratory based on visual observation, texture, plasticity, and the limited laboratory testing described below.

Moisture Content Determinations

Moisture content determinations were performed in accordance with ASTM D2216-10 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass (ASTM D2216) on representative samples obtained from the exploration in order to aid in identification and correlation of soil types. The moisture content of typical sample was measured and is reported on the test pit logs.

Grain Size Analysis

A grain size analysis indicates the range in diameter of soil particles included in a particular sample. Grain size analyses was determined using D6913-04(2009) Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis (ASTM D6913) on three of the samples.

Project Name: **Priya/Bathula 3-Lot Short Plat** Project Number: **2022-501-1** Client: **Vamshi Priya and Kranthi Bathula**	Test Pit No.: TP-1 **Sheet 1 of 1**

Date(s) Excavated: **8/26/2022**	Logged By **ELW**	Surface Conditions: **Ferns, Mixed Brush**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **10 feet bgs**
Excavator Type: **Mini Excavator**	Excavating Contractor: **Kelly's Excavating**	Approximate Surface Elevation **136**
Groundwater Level: **Not Encountered**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **8XX Front Street South, Issaquah, Washington**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
136	0			TPSL		6" topsoil	
				ML		Brown SILT with some sand, stiff to very stiff, moist	
							16% moisture
						Becomes very stiff	
131	5						15% moisture, 76% fines
							18% moisture
				SM		Brown gravelly silty SAND, medium dense, moist	
						Occasional cobble	
							15% moisture, 19% fines
126	10					Test Pit terminated at 10'	

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Project Name: **Priya/Bathula 3-Lot Short Plat**
Project Number: **2022-501-1**
Client: **Vamshi Priya and Kranthi Bathula**

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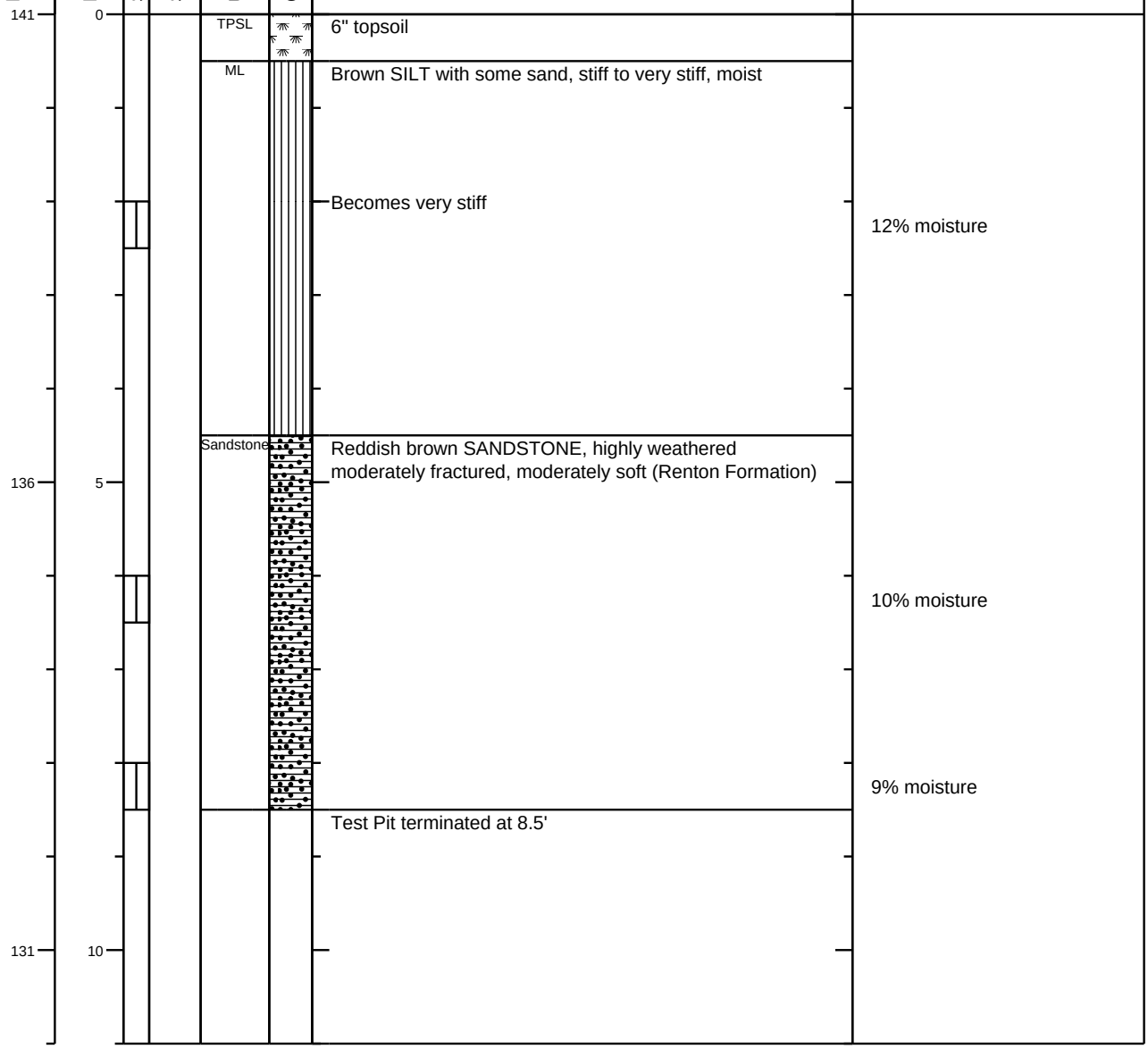
Test Pit No.: TP-2

Sheet 1 of 1

Date(s) Excavated: **8/26/2022**	Logged By **ELW**	Surface Conditions: **Mixed Brush**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **8.5 feet bgs**
Excavator Type: **Mini Excavator**	Excavating Contractor: **Kelly's Excavating**	Approximate Surface Elevation **141**
Groundwater Level: **Not Encountered**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **8XX Front Street South, Issaquah, Washington**	



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Project Name: **Priya/Bathula 3-Lot Short Plat**
Project Number: **2022-501-1**
Client: **Vamshi Priya and Kranthi Bathula**

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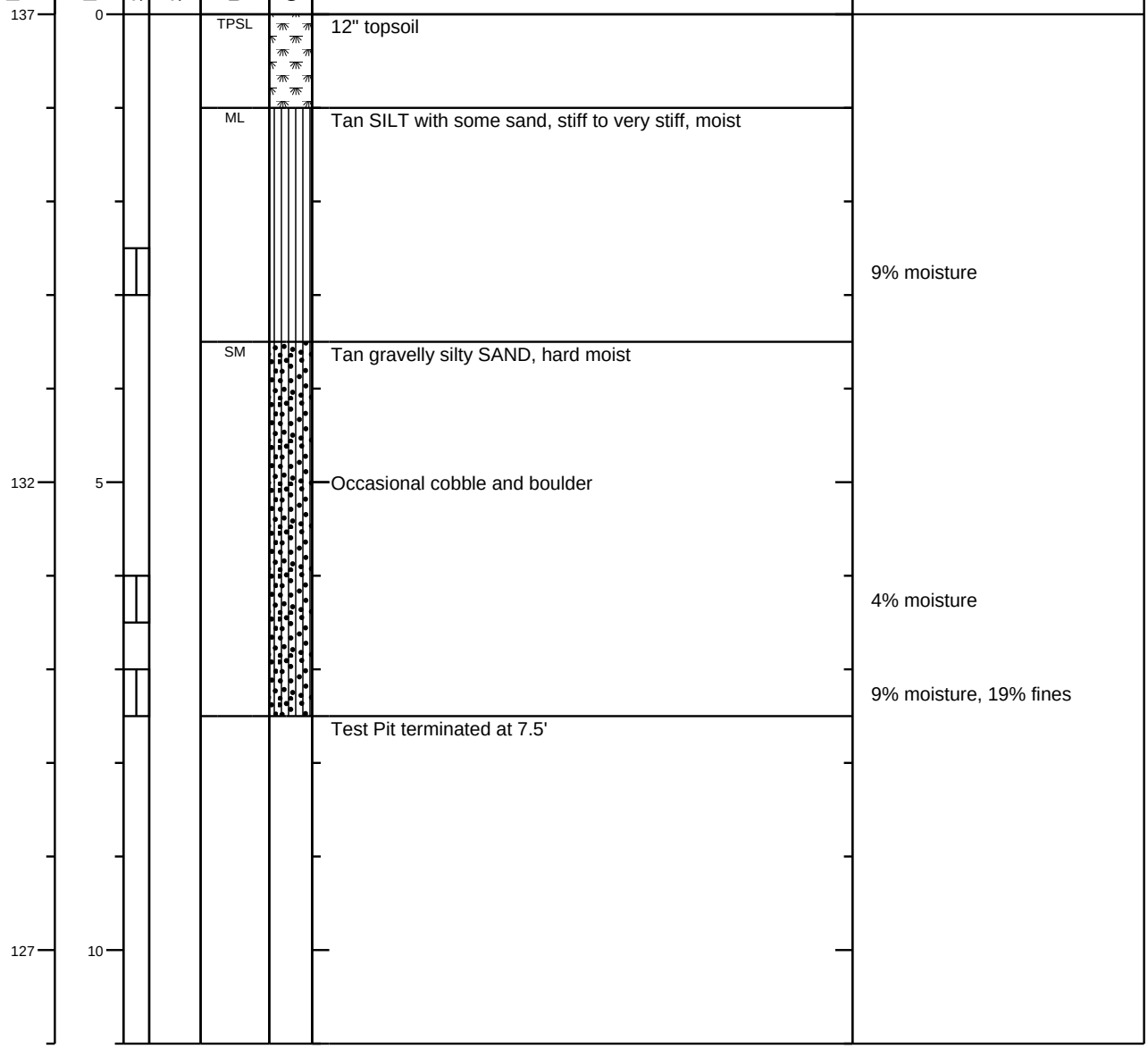
Test Pit No.: TP-3

Sheet 1 of 1

Date(s) Excavated: **8/26/2022**	Logged By **ELW**	Surface Conditions: **Ferns, Mixed Brush**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **7.5 feet bgs**
Excavator Type: **Mini Excavator**	Excavating Contractor: **Kelly's Excavating**	Approximate Surface Elevation **137**
Groundwater Level: **Not Encountered**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **8XX Front Street South, Issaquah, Washington**	



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Project Name: **Priya/Bathula 3-Lot Short Plat**
Project Number: **2022-501-1**
Client: **Vamshi Priya and Kranthi Bathula**

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Key to Logs

Sheet 1 of 1

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7	8

COLUMN DESCRIPTIONS

1. Elevation (feet): Elevation (MSL, feet).
2. Depth (feet): Depth in feet below the ground surface.
3. Sample Type: Type of soil sample collected at the depth interval shown.
4. Sample Number: Sample identification number.
5. USCS Symbol: USCS symbol of the subsurface material.
6. Graphic Log: Graphic depiction of the subsurface material encountered.
7. MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
8. REMARKS AND OTHER TESTS: Comments and observations regarding drilling or sampling made by driller or field personnel.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

SILT, SILT w/SAND, SANDY SILT (ML)
Silty SAND (SM)
Sandstone
Topsoil

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
CME Sampler
Pitcher Sample
Bulk Sample
Grab Sample
2-inch-OD unlined split spoon (SPT)
3-inch-OD California w/ brass rings
2.5-inch-OD Modified California w/ brass liners
Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

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GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Priya/Bathula 3-Lot Short Plat	**SAMPLE ID/TYPE**	TP-1
PROJECT NO.	2022-501-1	**SAMPLE DEPTH**	5'
TECH/TEST DATE	EW 9/1/2022	**DATE RECEIVED**	8/26/2022

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	302.9
Wt Dry Soil & Tare (gm)	(w2)	266.1
Weight of Tare (gm)	(w3)	16.0
Weight of Water (gm)	(w4=w1-w2)	36.8
Weight of Dry Soil (gm)	(w5=w2-w3)	250.1
Moisture Content (%)	(w4/w5)*100	15

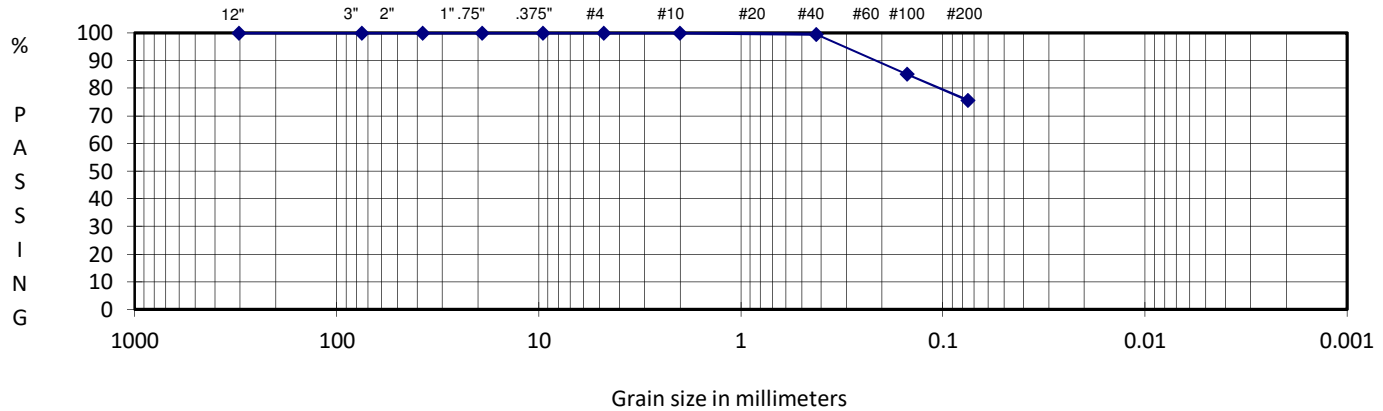
Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

Weight Of Sample (gm)		266.1
Tare Weight (gm)		16.0
(W6) Total Dry Weight (gm)		250.1

% COBBLES	**0.0**
% C GRAVEL	**0.0**
% F GRAVEL	**0.0**
% C SAND	**0.0**
% M SAND	**0.6**
% F SAND	**24.0**
% FINES	**75.5**
% TOTAL	**100.0**
D10 (mm)	
D30 (mm)	
D60 (mm)	
Cu	
Cc	

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	16.0	0.00	0.00	100.00	cobbles
3.0"	16.0	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	16.0	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	16.0	0.00	0.00	100.00	fine gravel
0.50"					fine gravel
0.375"	16.0	0.00	0.00	100.00	fine gravel
#4	16.0	0.00	0.00	100.00	coarse sand
#10	16.0	0.00	0.00	100.00	medium sand
#20					medium sand
#40	17.4	1.40	0.56	99.44	fine sand
#60					fine sand
#100	53.6	37.60	15.03	84.97	fine sand
#200	77.3	61.30	24.51	75.49	fines
PAN	266.1	250.10	100.00	0.00	silt/clay



DESCRIPTION	SILT with some sand
USCS	ML

Prepared For:
Vamshi Priya and Kranthi Bathula

Reviewed By:
ELW

RILEYGROUP

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011

PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Priya/Bathula 3-Lot Short Plat	**SAMPLE ID/TYPE**	TP-1
PROJECT NO.	2022-501-1	**SAMPLE DEPTH**	9.5'
TECH/TEST DATE	EW 9/1/2022	**DATE RECEIVED**	8/26/2022

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	439.8
Wt Dry Soil & Tare (gm)	(w2)	385.0
Weight of Tare (gm)	(w3)	15.9
Weight of Water (gm)	(w4=w1-w2)	54.8
Weight of Dry Soil (gm)	(w5=w2-w3)	369.1
Moisture Content (%)	(w4/w5)*100	15

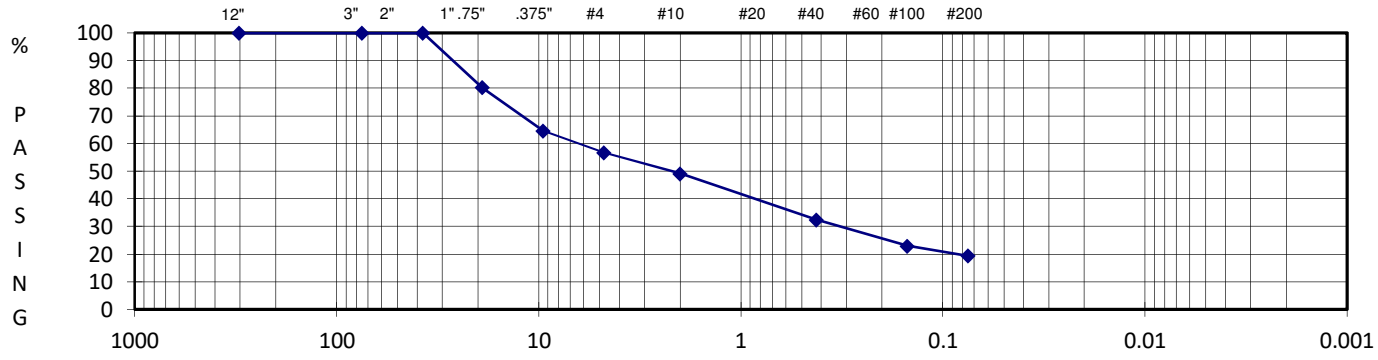
Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

Weight Of Sample (gm)		385.0
Tare Weight (gm)		15.9
(W6) Total Dry Weight (gm)		369.1

% COBBLES	**0.0**
% C GRAVEL	**19.8**
% F GRAVEL	**23.6**
% C SAND	**7.6**
% M SAND	**16.7**
% F SAND	**13.0**
% FINES	**19.3**
% TOTAL	**100.0**
D10 (mm)	
D30 (mm)	
D60 (mm)	
Cu	
Cc	

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	15.9	0.00	0.00	100.00	cobbles
3.0"	15.9	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	15.9	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	89.0	73.10	19.80	80.20	fine gravel
0.50"					fine gravel
0.375"	146.8	130.90	35.46	64.54	fine gravel
#4	176.0	160.10	43.38	56.62	coarse sand
#10	204.1	188.20	50.99	49.01	medium sand
#20					medium sand
#40	265.7	249.80	67.68	32.32	fine sand
#60					fine sand
#100	300.7	284.80	77.16	22.84	fine sand
#200	313.6	297.70	80.66	19.34	fines
PAN	385.0	369.10	100.00	0.00	silt/clay



DESCRIPTION	Gravelly silty SAND
USCS	SM

Prepared For:
Vamshi Priya and Kranthi Bathula

Reviewed By:
ELW

RILEYGROUP

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011

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FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Priya/Bathula 3-Lot Short Plat	**SAMPLE ID/TYPE**	TP-3
PROJECT NO.	2022-501-1	**SAMPLE DEPTH**	7'
TECH/TEST DATE	EW 9/1/2022	**DATE RECEIVED**	8/26/2022

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	578.7
Wt Dry Soil & Tare (gm)	(w2)	532.1
Weight of Tare (gm)	(w3)	16.2
Weight of Water (gm)	(w4=w1-w2)	46.6
Weight of Dry Soil (gm)	(w5=w2-w3)	515.9
Moisture Content (%)	(w4/w5)*100	9

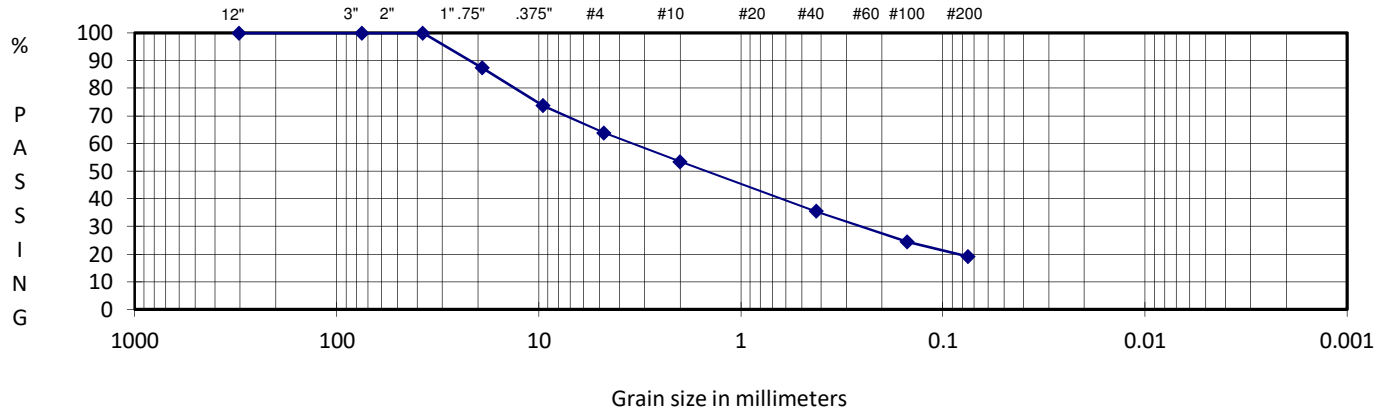
Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

Weight Of Sample (gm)		532.1
Tare Weight (gm)		16.2
(W6) Total Dry Weight (gm)		515.9

% COBBLES	**0.0**
% C GRAVEL	**12.6**
% F GRAVEL	**23.6**
% C SAND	**10.4**
% M SAND	**17.9**
% F SAND	**16.3**
% FINES	**19.2**
% TOTAL	**100.0**
D10 (mm)	
D30 (mm)	
D60 (mm)	
Cu	
Cc	

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	16.2	0.00	0.00	100.00	cobbles
3.0"	16.2	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	16.2	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	81.4	65.20	12.64	87.36	fine gravel
0.50"					fine gravel
0.375"	151.8	135.60	26.28	73.72	fine gravel
#4	202.9	186.70	36.19	63.81	coarse sand
#10	256.7	240.50	46.62	53.38	medium sand
#20					medium sand
#40	349.1	332.90	64.53	35.47	fine sand
#60					fine sand
#100	406.3	390.10	75.62	24.38	fine sand
#200	433.1	416.90	80.81	19.19	fines
PAN	532.1	515.90	100.00	0.00	silt/clay



DESCRIPTION	Gravelly silty SAND
USCS	SM

Prepared For:
Vamshi Priya and Kranthi Bathula

Reviewed By:
ELW

RILEYGROUP

Appendix B

Wetland Delineation Report by Altmann Oliver dated February 16, 2022

Altmann Oliver Associates, LLC

PO Box 578 Carnation, WA 98014 Office (425) 333-4535 Fax (425) 333-4509

AOA
Environmental
Planning &
Landscape
Architecture

February 16, 2022

AOA-6695

Farid Mohajerjasbi
Dynasty Realty Inc
dynastyrealtyinc@comcast.net

SUBJECT: **Wetland Delineation for Parcel 342406-9301**
City of Issaquah, WA

Dear Farid:

On January 11, 2022 I conducted a wetland reconnaissance on and adjacent to the undeveloped and forested subject property utilizing the methodology outlined in the May 2010 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0).*

One wetland (Wetland A) was identified and delineated in the western portion of the site during the field investigation. The boundary of the wetland was subsequently surveyed and is depicted on **Figure 1**. **Attachment A** contains data sheets prepared for a representative location in both the wetland and upland. These data sheets document the vegetation, soils, and hydrology information that aided in the wetland boundary delineation.

Wetland A

Wetland A on the site is part of a very large wetland system associated with Issaquah Creek. Most of the wetland was flooded at the time of the field investigation and the area of the wetland in the vicinity of the site included forested and emergent components that were dominated by red alder (*Alnus rubra*), Himalayan blackberry (*Rubus armeniacus*), salmonberry (*Rubus spectabilis*), reed canarygrass (*Phalaris arundinacea*), and soft rush (*Juncus effusus*).

Wetland A meets the criteria for a Category I wetland with 7 Habitat Points (**Attachment B**). Category I wetlands with 7 Habitat Points require a standard 150-foot buffer plus 15-foot building setback from the wetland edge.

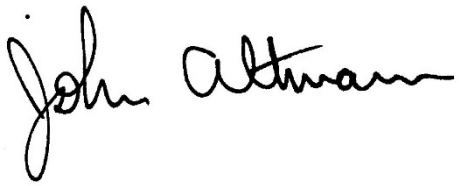
Recommendation

Since the majority of the wetland is located off-site it is my recommendation that the wetland delineation and rating be approved by the City of Issaquah as early in the process as possible.

If you have any questions regarding the delineation or rating, please give me a call.

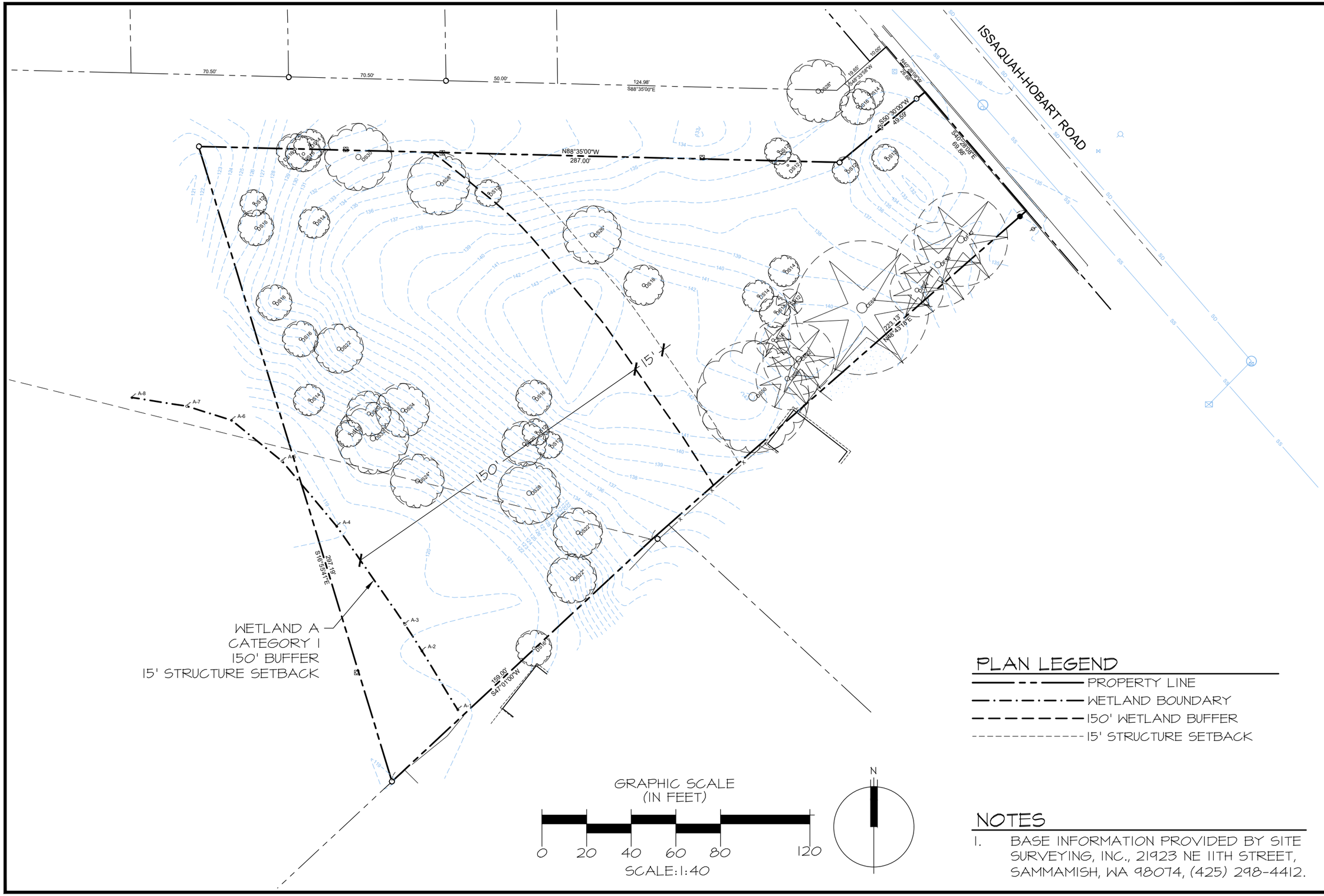
Sincerely,

ALTMANN OLIVER ASSOCIATES, LLC



John Altmann
Ecologist

Attachments



PLAN LEGEND

- PROPERTY LINE
- WETLAND BOUNDARY
- 150' WETLAND BUFFER
- 15' STRUCTURE SETBACK

NOTES

1. BASE INFORMATION PROVIDED BY SITE SURVEYING, INC., 21923 NE 11TH STREET, SAMMAMISH, WA 98074, (425) 298-4412.

FIGURE 1: CRITICAL AREAS MAP
DYNASTY REALTY
XX ISSAQUAH-HOBART ROAD
ISSAQUAH, WA 98027
PARCEL 3424069301

PROJECT 6695
DRAWN SO
SCALE AS NOTED
DATE 02-11-22
REVISED
1/1

Altmann Oliver Associates, LLC
PO Box 578 Carnation, WA 98014 Office (425) 333-4535 Fax (425) 333-4599
AOA Environmental Planning & Landscape Architecture

6695-MIT-02-11-22.dwg

ATTACHMENT A
DATA SHEETS

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project Site: Parcel 3424069301 City/County: Issaquah/King Sampling Date: 1/11/22
Applicant/Owner: Dynasty State: WA Sampling Point: DP#1
Investigator(s): John Altmann Section, Township, Range: S34,T24N,R6E
Landform (hillslope, terrace, etc.): ____ Local relief (concave, convex, none): ____ Slope (%): ____
Subregion (LRR): A Lat: 47.51994 Long: -122.03272 Datum: ____
Soil Map Unit Name: ____ NWI classification: ____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒	**Is the Sampled Area within a Wetland?**	**Yes ☒ No ☐**
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐		

Remarks: located 10' into wetland at A-7

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 10)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Alnus rubra*	75	yes	FAC
2. ____	____	____	____
3. ____	____	____	____
4. ____	____	____	____
50% = 37.5, 20% = 15	75	= Total Cover	
Sapling/Shrub Stratum (Plot size: 10)			
1. *Rubus laciniatus*	30	yes	FACU
2. *Rubus armeniacus*	20	yes	FAC
3. *Symphoricarpos albus*	5	no	FACU
4. ____	____	____	____
5. ____	____	____	____
50% = 27.5, 20% = 11	55	= Total Cover	
Herb Stratum (Plot size: 10)			
1. *Phalaris arundinacea*	30	yes	FACW
2. *Ranunculus repens*	20	yes	FAC
3. *Athyrium filix-femina*	10	no	FAC
4. ____	____	____	____
5. ____	____	____	____
6. ____	____	____	____
7. ____	____	____	____
8. ____	____	____	____
9. ____	____	____	____
10. ____	____	____	____
11. ____	____	____	____
50% = 30, 20% = 12	60	= Total Cover	
Woody Vine Stratum (Plot size: 10)			
1. *Rubus ursinus*	20	yes	FACU
2. ____	____	____	____
50% = 10, 20% = 4	20	= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	6	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	50	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	____	x1 =	____
FACW species	30	x2 =	60
FAC species	125	x3 =	375
FACU species	55	x4 =	220
UPL species	____	x5 =	____
Column Totals:	210 (A)		655 (B)

Prevalence Index = B/A = 3.12

Hydrophytic Vegetation Indicators:

- ☐ 1 – Rapid Test for Hydrophytic Vegetation
- ☐ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 5 - Wetland Non-Vascular Plants[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks:

Project Site: Parcel 3424069301

SOIL

Sampling Point: DP#1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR5/1	95	10YR4/3	5			clay	

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soils Present? **Yes** ☒ **No** ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☒ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stresses Plants (D1) **(LRR A)**
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes	☒	No	☐	Depth (inches):	4
Water Table Present?	Yes	☐	No	☐	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes	☐	No	☐	Depth (inches):	

Wetland Hydrology Present? **Yes** ☒ **No** ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project Site: Parcel 3424069301 City/County: Issaquah/King Sampling Date: 1/11/22
Applicant/Owner: Dynasty State: WA Sampling Point: DP#2
Investigator(s): John Altmann Section, Township, Range: S34,T24N,R6E
Landform (hillslope, terrace, etc.): ____ Local relief (concave, convex, none): ____ Slope (%): ____
Subregion (LRR): A Lat: 47.51994 Long: -122.03272 Datum: ____
Soil Map Unit Name: ____ NWI classification: ____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐, significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
Are Vegetation ☐, Soil ☐, or Hydrology ☐, naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒	**Is the Sampled Area within a Wetland?**	**Yes** ☐	**No** ☒
Hydric Soil Present?	Yes ☐	No ☒			
Wetland Hydrology Present?	Yes ☐	No ☒			

Remarks: located 10' into upland at A-7

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 10)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer macrophyllum*	100	yes	FACU
2. *Crataegus monogyna*	40	yes	FAC
3. *Ilex aquifolium*	30	no	FACU
4. ____	____	____	____
50% = 85, 20% = 34	170	= Total Cover	
Sapling/Shrub Stratum (Plot size: 10)			
1. *Ilex aquifolium*	10	yes	FACU
2. ____	____	____	____
3. ____	____	____	____
4. ____	____	____	____
5. ____	____	____	____
50% = 5, 20% = 2	10	= Total Cover	
Herb Stratum (Plot size: 10)			
1. *Polystichum munitum*	50	yes	FACU
2. *Pteridium aquilinum*	10	no	FACU
3. ____	____	____	____
4. ____	____	____	____
5. ____	____	____	____
6. ____	____	____	____
7. ____	____	____	____
8. ____	____	____	____
9. ____	____	____	____
10. ____	____	____	____
11. ____	____	____	____
50% = 30, 20% = 12	60	= Total Cover	
Woody Vine Stratum (Plot size: 10)			
1. *Rubus ursinus*	10	yes	FACU
2. ____	____	____	____
50% = 5, 20% = 2	10	= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 20 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	____	x1 =	____
FACW species	____	x2 =	____
FAC species	____	x3 =	____
FACU species	____	x4 =	____
UPL species	____	x5 =	____
Column Totals:	____ (A)		____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

☐ 1 – Rapid Test for Hydrophytic Vegetation
☐ 2 - Dominance Test is >50%
☐ 3 - Prevalence Index is ≤3.0[1]
☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
☐ 5 - Wetland Non-Vascular Plants[1]
☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☐ **No** ☒

Remarks:

Project Site: Parcel 3424069301

SOIL Sampling Point: DP#2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR3/2	100					loam	dry

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soils Present? **Yes** ☐ **No** ☒

Remarks: No redoximorphic features

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stresses Plants (D1) **(LRR A)**
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches):

Water Table Present? Yes ☐ No ☒ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches):

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

ATTACHMENT B
WETLAND RATING

Wetland name or number A

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Parcel 342406-9301 Date of site visit: 1/11/2022

Rated by Altmann Trained by Ecology? ☑ Yes ☐ No Date of training 03/08 & 03/15

HGM Class used for rating Depressional & Flats Wetland has multiple HGM classes? ☑ Yes ☐ No

NOTE: Form is not complete with out the figures requested (*figures can be combined*).
Source of base aerial photo/map King County iMAP

OVERALL WETLAND CATEGORY I (based on functions ☑ or special characteristics ☐)

1. Category of wetland based on FUNCTIONS

X **Category I** - Total score = 23 - 27
____ **Category II** - Total score = 20 - 22
____ **Category III** - Total score = 16 - 19
____ **Category IV** - Total score = 9 - 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
	List appropriate rating (H, M, L)			
Site Potential	H	M	H	
Landscape Potential	M	H	L	
Value	H	H	H	**Total**
Score Based on Ratings	8	8	7	**23**

Score for each function based on three ratings (*order of ratings is not important*)

9 = H, H, H
8 = H, H, M
7 = H, H, L
7 = H, M, M
6 = H, M, L
6 = M, M, M
5 = H, L, L
5 = M, M, L
4 = M, L, L
3 = L, L, L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	Category
Estuarine	
Wetland of High Conservation Value	
Bog	
Mature Forest	
Old Growth Forest	
Coastal Lagoon	
Interdunal	
None of the above	**X**

Wetland name or number A

DEPRESSIONAL AND FLATS WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

D 1.0. Does the site have the potential to improve water quality?		
D 1.1. Characteristics of surface water outflows from the wetland:		
Wetland is a depression or flat depression (QUESTION 7 on key) with no surface water leaving it (no outlet).	points = 3	2
Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet.	points = 2	
☐ Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing	points = 1	
☐ Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch.	points = 1	
D 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic (*use NRCS definitions*).	Yes = 4 No = 0	4
D 1.3. Characteristics and distribution of persistent plants (Emergent, Scrub-shrub, and/or Forested Cowardin classes):		
Wetland has persistent, ungrazed, plants > 95% of area	points = 5	3
Wetland has persistent, ungrazed, plants > ½ of area	points = 3	
Wetland has persistent, ungrazed plants > $^1/_{10}$ of area	points = 1	
Wetland has persistent, ungrazed plants < $^1/_{10}$ of area	points = 0	
D 1.4. Characteristics of seasonal ponding or inundation:		
This is the area that is ponded for at least 2 months. See description in manual.		
Area seasonally ponded is > ½ total area of wetland	points = 4	4
Area seasonally ponded is > ¼ total area of wetland	points = 2	
Area seasonally ponded is < ¼ total area of wetland	points = 0	
Total for D 1	Add the points in the boxes above	**13**

Rating of Site Potential If score is: ☑ **12 - 16 = H** ☐ **6 - 11 = M** ☐ **0 - 5 = L** *Record the rating on the first page*

D 2.0. Does the landscape have the potential to support the water quality function of the site?		
D 2.1. Does the wetland unit receive stormwater discharges?	Yes = 1 No = 0	1
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants?	Yes = 1 No = 0	1
D 2.3. Are there septic systems within 250 ft of the wetland?	Yes = 1 No = 0	0
D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1 - D 2.3?		0
Source	Yes = 1 No = 0	
Total for D 2	Add the points in the boxes above	**2**

Rating of Landscape Potential If score is: ☐ **3 or 4 = H** ☑ **1 or 2 = M** ☐ **0 = L** *Record the rating on the first page*

D 3.0. Is the water quality improvement provided by the site valuable to society?		
D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list?	Yes = 1 No = 0	1
D 3.2. Is the wetland in a basin or sub-basin where an aquatic resource is on the 303(d) list?	Yes = 1 No = 0	1
D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (*answer YES if there is a TMDL for the basin in which the unit is found*)?	Yes = 2 No = 0	2
Total for D 3	Add the points in the boxes above	**4**

Rating of Value If score is: ☑ **2 - 4 = H** ☐ **1 = M** ☐ **0 = L** *Record the rating on the first page*

Wetland name or number A

DEPRESSIONAL AND FLATS WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream degradation

D 4.0. Does the site have the potential to reduce flooding and erosion?	
D 4.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet points = 2 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch points = 1 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 0	2
D 4.2. Depth of storage during wet periods: *Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or if dry, the deepest part.* Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 ☐ Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 ☐ The wetland is a "headwater" wetland points = 3 Wetland is flat but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft (6 in) points = 0	5
D 4.3. Contribution of the wetland to storage in the watershed: *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* ☐ The area of the basin is less than 10 times the area of the unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 ☐ Entire wetland is in the Flats class points = 5	3
Total for D 4 Add the points in the boxes above	**10**

Rating of Site Potential If score is: ☐ **12 - 16 = H** ☑ **6 - 11 = M** ☐ **0 - 5 = L** *Record the rating on the first page*

D 5.0. Does the landscape have the potential to support hydrologic function of the site?	
D 5.1. Does the wetland unit receive stormwater discharges? Yes = 1 No = 0	1
D 5.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate excess runoff? Yes = 1 No = 0	1
D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses (residential at >1 residence/ac, urban, commercial, agriculture, etc.)? Yes = 1 No = 0	1
Total for D 5 Add the points in the boxes above	**3**

Rating of Landscape Potential If score is: ☑ **3 = H** ☐ **1 or 2 = M** ☐ **0 = L** *Record the rating on the first page*

D 6.0. Are the hydrologic functions provided by the site valuable to society?	
D 6.1. The unit is in a landscape that has flooding problems. *Choose the description that best matches conditions around the wetland unit being rated. Do not add points. Choose the highest score if more than one condition is met.* The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds): ● Flooding occurs in a sub-basin that is immediately down-gradient of unit. points = 2 ☐ ● Surface flooding problems are in a sub-basin farther down-gradient. points = 1 ☐ Flooding from groundwater is an issue in the sub-basin. points = 1 ☐ The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. Explain why points = 0 ☐ There are no problems with flooding downstream of the wetland. points = 0	2
D 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	2
Total for D 6 Add the points in the boxes above	**4**

Rating of Value If score is: ☑ **2 - 4 = H** ☐ **1 = M** ☐ **0 = L** *Record the rating on the first page*

Wetland name or number A

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.*

- ☐ Aquatic bed
- ☑ Emergent
- ☑ Scrub-shrub (areas where shrubs have > 30% cover)
- ☑ Forested (areas where trees have > 30% cover)

4 structures or more: points = 4
3 structures: points = 2
2 structures: points - 1
1 structure: points = 0

If the unit has a Forested class, check if:

- ☑ The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon

4

H 1.2. Hydroperiods

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).

- ☑ Permanently flooded or inundated
- ☑ Seasonally flooded or inundated
- ☑ Occasionally flooded or inundated
- ☐ Saturated only

4 or more types present: points = 3
3 types present: points = 2
2 types present: points = 1
1 types present: points = 0

- ☑ Permanently flowing stream or river in, or adjacent to, the wetland
- ☐ Seasonally flowing stream in, or adjacent to, the wetland
- ☐ **Lake Fringe wetland** **2 points**
- ☐ **Freshwater tidal wetland** **2 points**

3

H 1.3. Richness of plant species

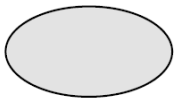
Count the number of plant species in the wetland that cover at least 10 ft^2.
Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***

If you counted:
- > 19 species — points = 2
- 5 - 19 species — points = 1
- < 5 species — points = 0

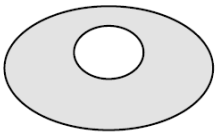
2

H 1.4. Interspersion of habitats

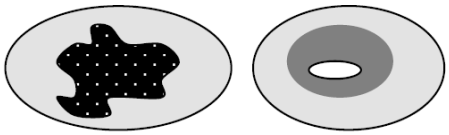
Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



None = 0 points

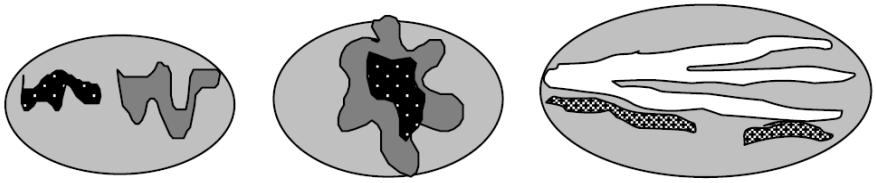


Low = 1 point



Moderate = 2 points

All three diagrams in this row are **HIGH** = 3 points



3

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* ☑ Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long) ☑ Standing snags (dbh > 4 in) within the wetland ☑ Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ☐ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present (*cut shrubs or trees that have not yet weathered where wood is exposed*) ☑ At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated (*structures for egg-laying by amphibians*) ☐ Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	4
Total for H 1 — Add the points in the boxes above	**16**

Rating of Site Potential If Score is: ☑ **15 - 18 = H** ☐ **7 - 14 = M** ☐ **0 - 6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat function of the site?	
H 2.1 Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* 0 % undisturbed habitat + (0.5 % moderate & low intensity land uses / 2) = 0.25% If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon — points = 3 20 - 33% of 1 km Polygon — points = 2 10 - 19% of 1 km Polygon — points = 1 < 10 % of 1 km Polygon — points = 0	0
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* 36 % undisturbed habitat + (10.2 % moderate & low intensity land uses / 2) = 41.1% Undisturbed habitat > 50% of Polygon — points = 3 Undisturbed habitat 10 - 50% and in 1-3 patches — points = 2 Undisturbed habitat 10 - 50% and > 3 patches — points = 1 Undisturbed habitat < 10% of 1 km Polygon — points = 0	2
H 2.3 Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use — points = (-2) ≤ 50% of 1km Polygon is high intensity — points = 0	-2
Total for H 2 — Add the points in the boxes above	**0**

Rating of Landscape Potential If Score is: ☐ **4 - 6 = H** ☐ **1 - 3 = M** ☑ **< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated*. Site meets ANY of the following criteria: — points = 2 ☑ It has 3 or more priority habitats within 100 m (see next page) ☑ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) ☐ It is mapped as a location for an individual WDFW priority species ☐ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources ☐ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) with in 100m — points = 1 Site does not meet any of the criteria above — points = 0	2

Rating of Value If Score is: ☑ **2 = H** ☐ **1 = M** ☐ **0 = L** *Record the rating on the first page*

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp.
http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here:
http://wdfw.wa.gov/conservation/phs/list/

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: ***NOTE**: This question is independent of the land use between the wetland unit and the priority habitat.*

- ☐ **Aspen Stands**: Pure or mixed stands of aspen greater than 1 ac (0.4 ha).
- ☐ **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).
- ☐ **Herbaceous Balds**: Variable size patches of grass and forbs on shallow soils over bedrock.
- ☐ **Old-growth/Mature forests**: Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.
- ☐ **Oregon White Oak**: Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).
- ☑ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.
- ☐ **Westside Prairies**: Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).
- ☑ **Instream**: The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.
- ☐ **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page*).
- ☐ **Caves**: A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.
- ☐ **Cliffs**: Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.
- ☐ **Talus**: Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.
- ☑ **Snags and Logs**: Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Altmann Oliver Associates, LLC
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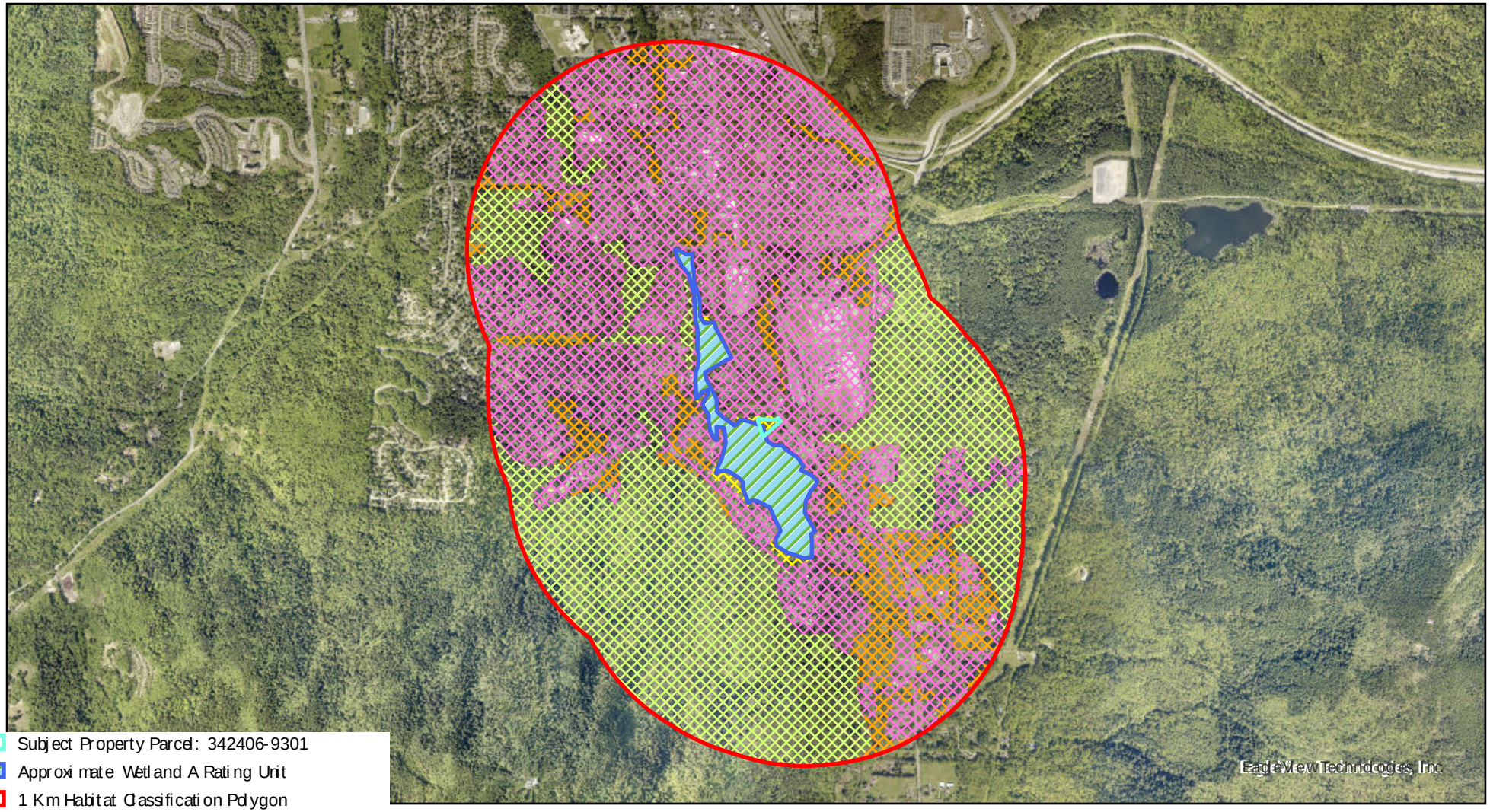
AOA
Environmental
Planning &
Landscape
Architecture

King County
Parcel 122305-9025

Figure A

AOA - 6695



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King County
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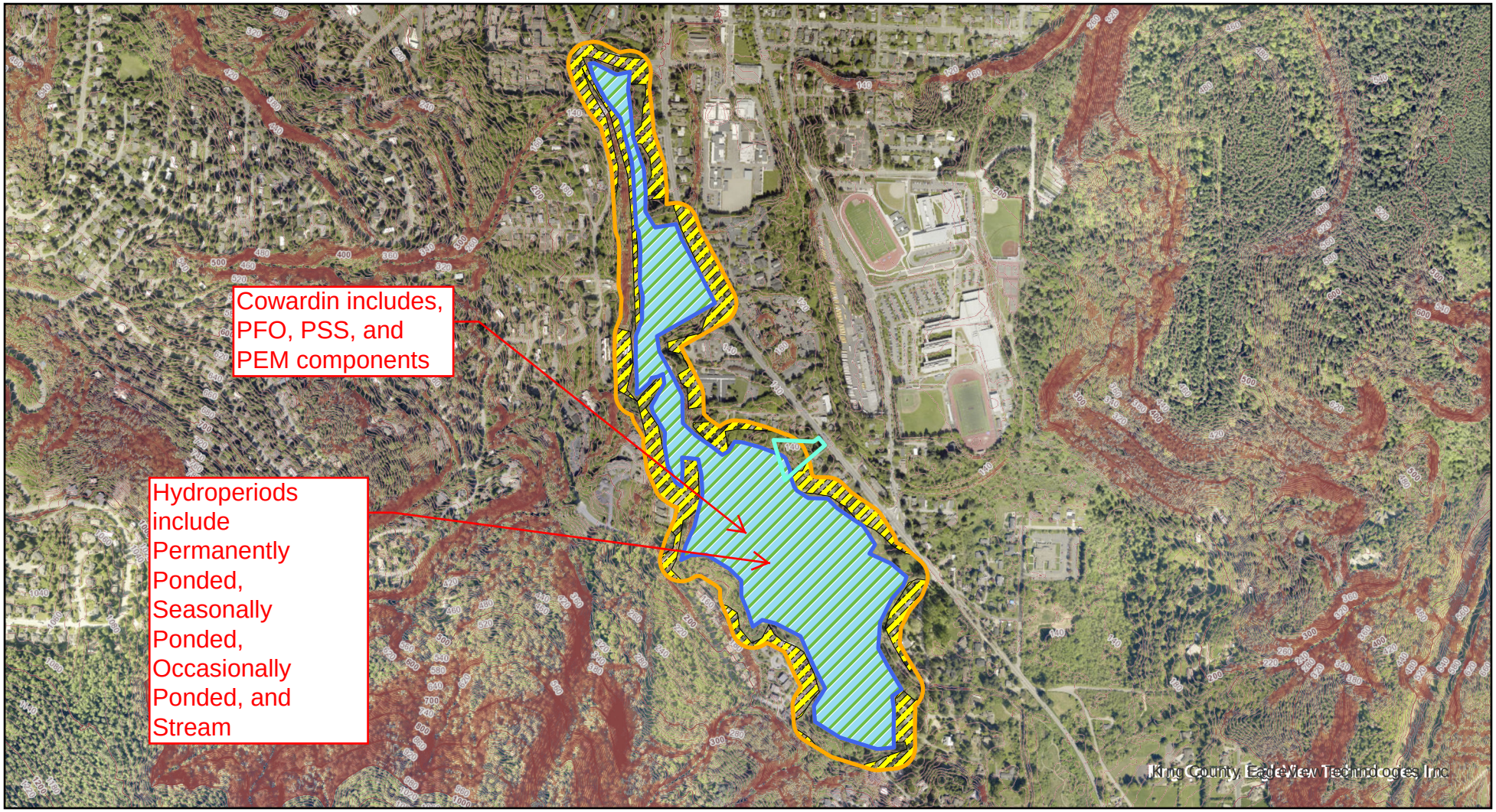
Figure B

AOA - 6695



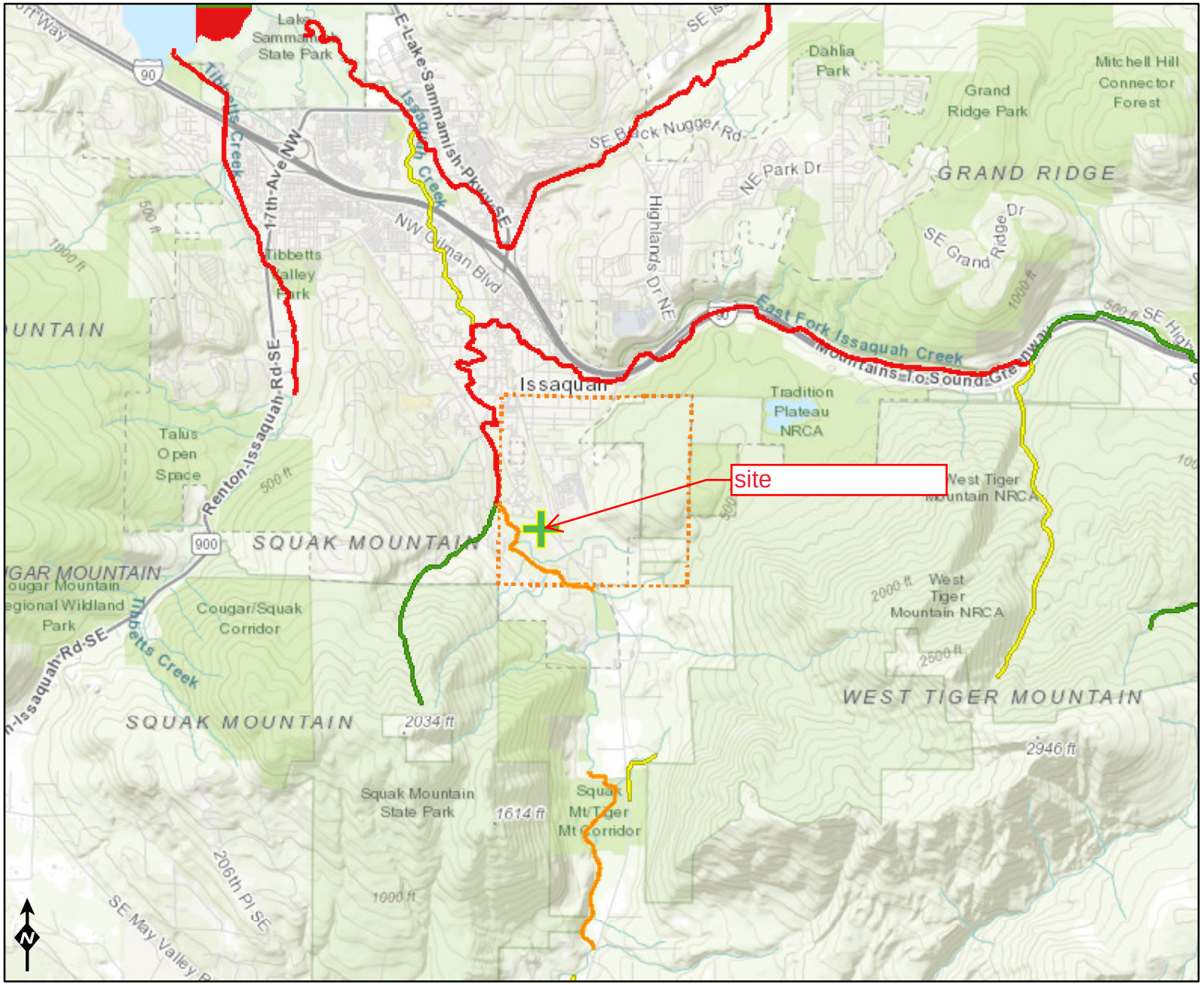
Subject Property Parcel: 342406-9301
Approximate Wetland A Rating Unit
150' Pollution Assessment Polygon
Pollution Generating Surfaces 53.5 %

0 412.5 825 1,650 2,475 3,300
US Feet

N

January 21, 2022

6695 Figure C



Assessed Water/Sediment

Water
- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Sediment
- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

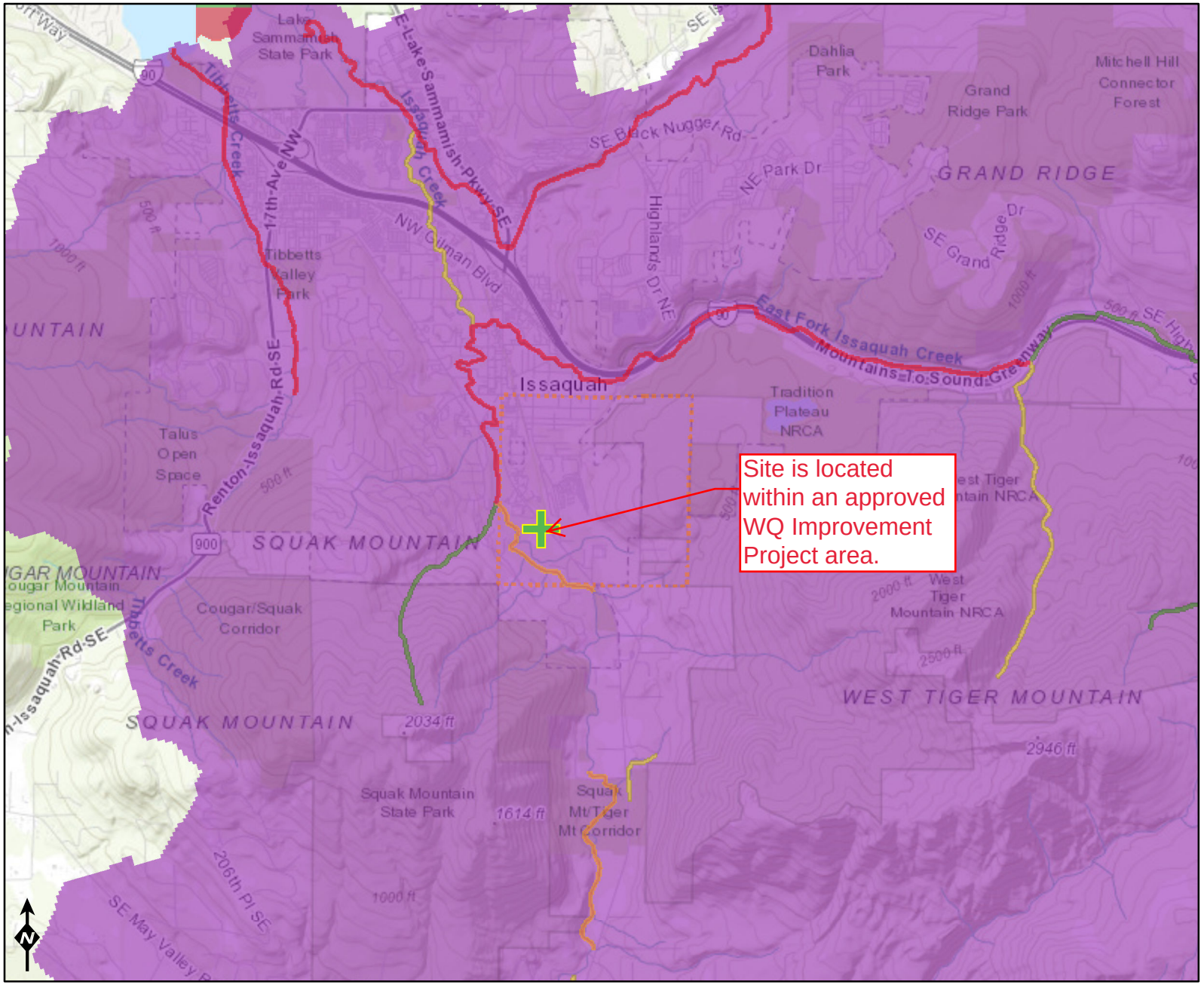
Miles
0 0.5 1 2

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and

DEPARTMENT OF ECOLOGY
State of Washington

January 21, 2022

6695 Figure D



Assessed Water/Sediment

Water
- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Sediment
- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

WQ Improvement Projects
- Approved
- In Development

Miles
0 0.5 1 2

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and

DEPARTMENT OF ECOLOGY
State of Washington

Appendix C

Arborist Report dated September 9, 2022

TREE FROG LLC
CONSULTING ARBORIST

To:	Kranthi Bathula
Job Site:	N/A
Parcel:	3424069301
Subject:	Arborist Report
Date:	9/9/2022
From:	Andy Crossett, ISA Certified Arborist #PN-7375A, Qualified Tree Risk Assessor, WSNLA Certified Professional Horticulturist #2537

Assignment

On Monday, August 15th, 2022, Kranthi Bathula contacted me with a request for a tree inventory report and custom tree protection plan for his Issaquah property. On Tuesday, August 23rd, I walked the site with Mr. Bathula to inspect the trees and document my findings.

A summary, tree table, and site map can be found below under sections 1 - 5**.**

Where applicable, I have categorized risk based on the methodologies presented in the International Society of Arboriculture's Tree Risk Assessment (Best Management Practices).

My responsibilities were to provide the following:

A tree plan that includes a tree inventory, site plan, replanting information (if necessary), tree protection measures for on-site and off-site trees (where CRZ extends on-site), and recommendations that will meet the minimum city of **Issaquah** tree code requirements.

Site Description

This 54,450 square foot lot is located south-west of Front Street S. The property is undeveloped and heavily forested with a typical mix of native Puget sound lowland evergreen and deciduous trees. The north-east portion of the property is fairly level, but the south-west portion does abruptly slope down from north-east to south-west.

Subject Trees – Thirty-one (31) on-site trees and one (1) off-site tree.

1. Summary

This report is preliminary as I have not reviewed any design plans or construction details for the site. Tree locations are based on a provided site survey and observations during my site visit.

- Twenty-six (26) significant, but not landmark trees were located on-site. The trees are currently in good condition and viable for retention.
- Five (5) landmark trees were located on-site. The trees are currently in good condition and viable for retention.
- One (1) tree has been identified growing off-site, but with critical root zones that extend on-site.

Retained trees will require protection measures to ensure they are not significantly impacted by construction. Issaquah tree protection measures, fencing details, and ISA recommended tree protection guidelines can be found within this report.

2. Tree Retention Calculation

Lot Square Footage	DBH of all on-site significant trees	30% DBH retained	DBH proposed for removal	Retained DBH	% Retained
54,450	540 inches	162 inches	Unknown	Unknown	Unknown

TREE FROG LLC
https://www.treefrogllc.com/
PO Box 307, Duvall, WA 98019
[**P**] 206-310-8254 [**E**] andycrossett@hotmail.com

3. Tree Replacement

18.12.1390 Replacement trees.

A. Replacement Tree Requirement: Trees removed pursuant to the provisions of this chapter shall be replaced per the following criteria:

1. For tree removal associated with a commercial or multifamily revision to an approved landscape plan, replacement may be calculated based on meeting the landscape plan purpose and intent. This may include: adjustments to the timing of replacement up to six (6) months, or to the size of replacement trees up to one (1) inch, when justification can be provided that the changes meet or exceed the original landscape plan.

2. For All Other Tree Removal: One (1) replacement tree for every six (6) inches of caliper at dbh of trees removed if remaining tree density is below the minimum requirements in IMC 18.12.1370, Minimum tree density requirements.

3. All replacement trees shall be:

   a. A minimum of two (2) inch caliper for deciduous trees and seven (7) to eight (8) feet tall for conifers for multifamily and commercial lots;

   b. A minimum of five (5) gallon for existing single family lots.

4. Tree replacement must be completed the end of the calendar year the tree is removed.

5. Single Family Lots: Replacement for hazardous tree removal is not required.

4. Tree Inventory Table

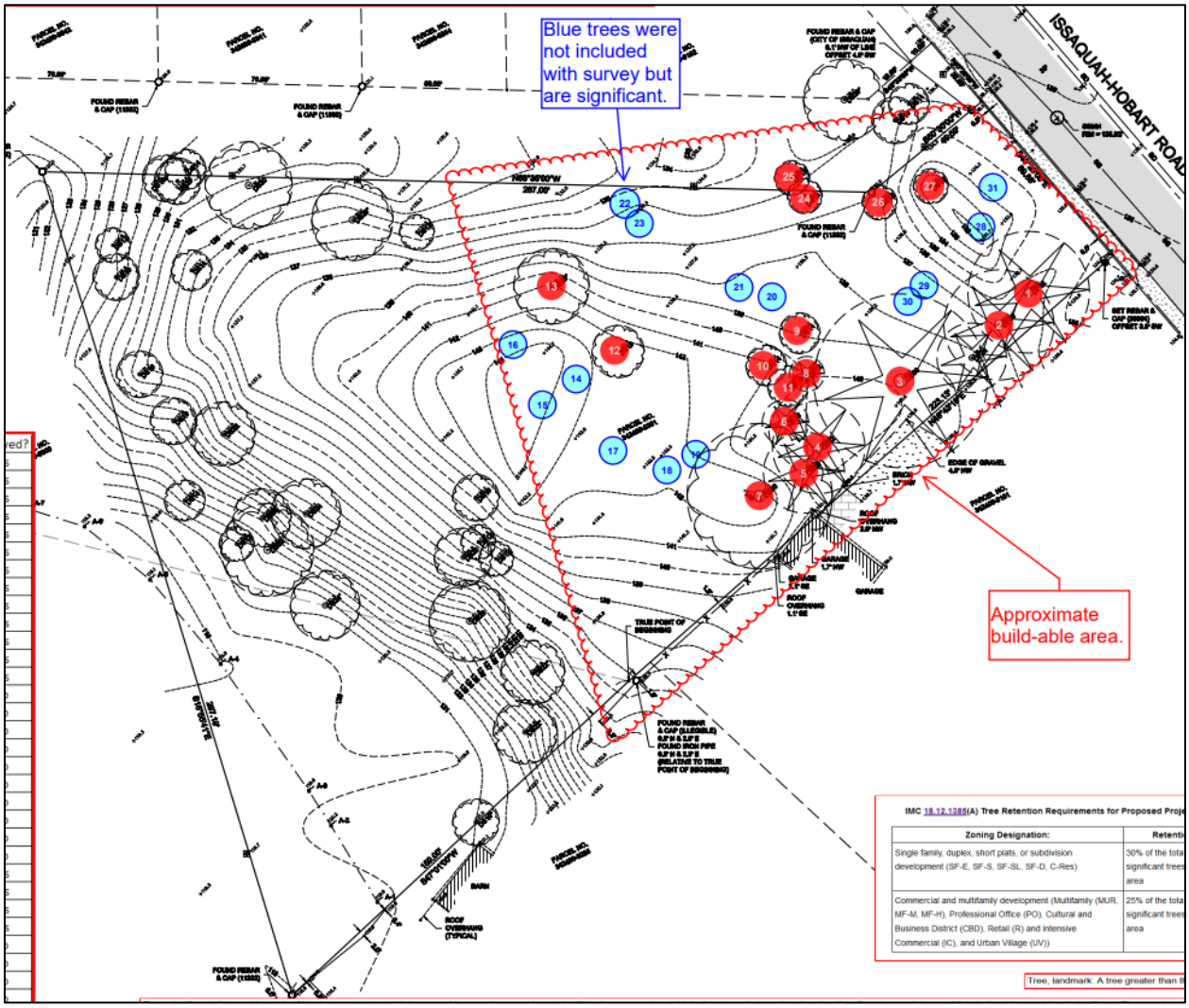
Tree ID	Parcel/Location	Species	DBH (inches)	Health Condition	Structural Condition	Combined Viability	Average Dripline (radius)	TPZ radius (min. allowable)	Landmark (Yes/No)	Proposed Action	Risk Rating	Comments
1	**3424069301**	Douglas fir *Pseudotsuga menziesii*	42	Good	Good	Viable	20′	20′	**Yes**	Unknown	**Low**	
2	**3424069301**	Douglas fir *Pseudotsuga menziesii*	38	Good	Good	Viable	20′	20′	**Yes**	Unknown	**Low**	
3	**3424069301**	Western Redcedar *Thuja plicata*	62	Good	Good	Viable	20′	20′	**Yes**	Unknown	**Low**	
4	**3424069301**	Western Redcedar *Thuja plicata*	32	Good	Good	Viable	15′	15′	**Yes**	Unknown	**Low**	
5	**3424069301**	Western Redcedar *Thuja plicata*	28	Good	Good	Viable	15′	15′	**No**	Unknown	**Low**	
6	**3424069301**	Western Redcedar *Thuja plicata*	16	Good	Good	Viable	15′	15′	**No**	Unknown	**Low**	
7	**3424069301**	Bigleaf Maple *Acer macrophyllum*	50	Good	Good	Viable	20′	20′	**Yes**	Unknown	**Low**	
8	**3424069301**	Western Redcedar *Thuja plicata*	12	Good	Good	Viable	10′	10′	**No**	Unknown	**Low**	
9	**3424069301**	Western Redcedar *Thuja plicata*	14	Good	Good	Viable	10′	10′	**No**	Unknown	**Low**	

Tree ID	Parcel/Location	Species	DBH (inches)	Health Condition	Structural Condition	Combined Viability	Average Dripline (radius)	TPZ radius (min. allowable)	Landmark (Yes/No)	Proposed Action	Risk Rating	Comments
10	**3424069301**	Red Alder *Alnus rubra*	14	Good	Good	Viable	10′	10′	**No**	Unknown	**Low**	
11	**3424069301**	Red Alder *Alnus rubra*	14	Good	Good	Viable	10′	10′	**No**	Unknown	**Low**	
12	**3424069301**	Bigleaf Maple *Acer macrophyllum*	16	Good	Good	Viable	10′	10′	**No**	Unknown	**Low**	
13	**3424069301**	Bigleaf Maple *Acer macrophyllum*	26	Good	Good	Viable	15′	15′	**No**	Unknown	**Low**	
14	**3424069301**	Black Hawthorn *Crataegus douglasii*	8	Good	Good	Viable	7.5′	7.5′	**No**	Unknown	**Low**	
15	**3424069301**	Red Alder *Alnus rubra*	10	Good	Good	Viable	7.5′	7.5′	**No**	Unknown	**Low**	
16	**3424069301**	Hazelnut *Corylus cornuta*	8	Good	Good	Viable	7.5′	7.5′	**No**	Unknown	**Low**	
17	**3424069301**	Black Hawthorn *Crataegus douglasii*	7	Good	Good	Viable	7.5′	7.5′	**No**	Unknown	**Low**	
18	**3424069301**	Black Hawthorn *Crataegus douglasii*	7	Good	Good	Viable	7.5′	7.5′	**No**	Unknown	**Low**	
19	**3424069301**	Red Alder *Alnus rubra*	7	Good	Good	Viable	7.5′	7.5′	**No**	Unknown	**Low**	

Tree ID	Parcel/Location	Species	DBH (inches)	Health Condition	Structural Condition	Combined Viability	Average Dripline (radius)	TPZ radius (min. allowable)	Landmark (Yes/No)	Proposed Action	Risk Rating	Comments
20	**3424069301**	Black Cottonwood *Populus trichocarpa*	12	Good	Good	Viable	10’	10’	**No**	Unknown	**Low**	
21	**3424069301**	Silver Birch *Betula pendula*	8	Good	Good	Viable	7.5’	7.5’	**No**	Unknown	**Low**	
22	**3424069301**	Bitter Cherry *Prunus emarginata*	12	Good	Good	Viable	10’	10’	**No**	Unknown	**Low**	
23	**3424069301**	Bitter Cherry *Prunus emarginata*	12	Good	Good	Viable	10’	10’	**No**	Unknown	**Low**	
24	**3424069301**	Bitter Cherry *Prunus emarginata*	12	Good	Good	Viable	10’	10’	**No**	Unknown	**Low**	
25	**3424069300 (off-site)**	Bitter Cherry *Prunus emarginata*	12	Good	Good	Viable	10’	10’	**No**	Unknown	**Low**	
26	**3424069301**	Bitter Cherry *Prunus emarginata*	12	Good	Good	Viable	10’	10’	**No**	Unknown	**Low**	
27	**3424069301**	Bitter Cherry *Prunus emarginata*	12	Good	Good	Viable	10’	10’	**No**	Unknown	**Low**	
28	**3424069301**	Bitter Cherry *Prunus emarginata*	12	Good	Good	Viable	10’	10’	**No**	Unknown	**Low**	
29	**3424069301**	Bigleaf Maple *Acer macrophyllum*	6	Good	Good	Viable	7.5’	7.5’	**No**	Unknown	**Low**	

Tree ID	Parcel/Location	Species	DBH (inches)	Health Condition	Structural Condition	Combined Viability	Average Dripline (radius)	TPZ radius (min. allowable)	Landmark (Yes/No)	Proposed Action	Risk Rating	Comments
30	**3424069301**	Bitter Cherry *Prunus emarginata*	7	Good	Good	Viable	7.5’	7.5’	**No**	Unknown	**Low**	
31	**3424069301**	Bitter Cherry *Prunus emarginata*	12	Good	Good	Viable	10’	10’	**No**	Unknown	**Low**	
32	**3424069301**	Silver Birch *Betula pendula*	12	Good	Good	Viable	10’	10’	**No**	Unknown	**Low**	

5. Site Map


Blue trees were not included with survey but are significant.
ISSAQUAH-HOBART ROAD
Approximate build-able area.
IMC 18.12.1385(A) Tree Retention Requirements for Proposed Proje
Zoning Designation:
Retenti
Single family, duplex, short plats, or subdivision development (SF-E, SF-S, SF-SL, SF-D, C-Res)
30% of the tota significant trees area
Commercial and multifamily development (Multifamily (MUR, MF-M, MF-H), Professional Office (PO), Cultural and Business District (CBD), Retail (R) and Intensive Commercial (IC), and Urban Village (UV))
25% of the tota significant trees area
Tree, landmark: A tree greater than t

6. Details of Risk Assessment

Level 2: Basic Assessment

A level 2 basic assessment is the standard assessment performed for tree risk. The assessment includes a detailed visual inspection of a tree and its surrounding site, and a synthesis of the information collected. The basic assessment involves walking completely around the tree – looking at the site, buttress roots, trunk, and branches. The tree is viewed from a distance, as well as close up, to consider crown shape and surroundings.

Methodology – When identifying potential hazard trees, I must consider a variety of factors that could contribute to failure. This can include the following: previous history of site failures, topography, site changes, prevailing wind direction and exposure, tree size and species, growth habit, overall vigor, the density and health of the foliage and crown, examination of root and root collar health, dead wood, hanging or broken branches, and evidence of disease-causing bacteria, fungi, or virus.

Tools Utilized: Binoculars, compass, hammer, diameter tape, clinometer

Timeline – This assessment covers a five-year period and is based on conditions present at the time of the assessment.

7. Definitions:

Diameter at Breast Height (DBH) – The diameter or thickness of a tree trunk measured at 4.5 feet above average grade. For trees with multiple trunks at 4.5 feet height, only trunks 3" DBH or greater shall be included. Where a tree splits into several trunks close to ground level, the DBH for the tree is the square root of the sum of the DBH for each individual stem squared (example with 3 trunks: DBH = square root [(stem1)2 + (stem2)2 + (stem3)2]). If a tree has been removed and only the stump remains that is below 4.5 feet tall, the size of the tree shall be the diameter of the top of the stump.

Significant Tree Issaquah –A tree at least six (6) inches or greater at d.b.h. or an alder or cottonwood tree eight (8) inches or greater at d.b.h. Any trees that are listed on the King County complete weed list shall not be considered significant. The complete King County weed list includes: Class A noxious weeds, Class B noxious weeds, Class C noxious weeds, nonregulated noxious weeds or weeds of concern lists as adopted by King County noxious weed list, in accordance with Chapter 17.10 RCW and Chapter 16-750 WAC.

Landmark Tree – Tree, landmark: A tree greater than thirty (30) inches d.b.h.

Dripline – The distance from the tree trunk that is equal to the furthest extent of the tree's crown. For trees with asymmetrical crowns, the dripline shall be measured in all four cardinal directions (North, South, East, West).

Tree Protection Zone (TPZ) – A defined area within and including an outer boundary, as determined by a Qualified Professional Arborist, in which certain activities are prohibited or restricted to prevent or minimize potential impacts from construction or development, applicable to individual trees or groups of tree trunks, roots and soil. TPZ is measured in feet from the face of the trunk and may be determined using Critical Root Zone, dripline, exploratory root excavations or other methodologies. The TPZ is variable depending on species, age and health of the tree, soil conditions and proposed construction. TPZ denotes the location of tree protection fencing.

Referenced Municipal Code:

City of Issaquah Trees
https://www.issaquahwa.gov/1071/Trees

Chapter 18.12 LANDSCAPING AND TREE RESERVATION
https://www.codepublishing.com/WA/Issaquah/html/Issaquah18/Issaquah1812.html#18.12.1385

8. Tree Protection Timeline and Site Recommendations

Prior to construction, the following measures should be taken to ensure that trees are not damaged.

1) Project managers should review the contents of this report, including the International Society of Arboriculture's recommended tree protection measures found below under section 9 of this report. Information contained herein should be relayed to workers and subcontractors.

2) To minimize soil compaction, 8 – 12 inches of medium fine mulch should be applied within the recommended tree protection zones of this report. It should be kept at a minimum of 12 inches from the protected tree's trunk.

3) Once the mulch has been applied, tree protection fencing should be installed per **18.12.141 Tree plan requirements.**

Additional site recommendations.

- Tree protection fencing and mulch should only be adjusted when access is required, such as, when scaffolding is utilized. Once the work has been completed, the fencing should return to its original placement.

- The following should be avoided within TPZ's: Stockpile construction materials or demolition debris, park vehicles or equipment, pile soil and/or mulch, contaminate soil from washing out equipment (especially concrete) and vehicle maintenance, and wound or break tree trunks or branches through contact with vehicles and heavy equipment.

- Post appropriate signage to help convey the importance of the TPZ to workers.

- Make all necessary cuts to tree roots cleanly with sharp tools; never tear with a backhoe. A clean cut encourages good wound closure and confines the spread of decay.

- All pruning should be conducted by an International Society of Arboriculture (ISA) certified arborist and following current ANSI A300 specifications.

- The project arborist shall supervise that the tree protection plan is being implemented.

9. ISA Recommended Tree Protection Information

The Pacific Northwest Chapter of the ISA Recommends the following for protecting trees from damage during construction.

https://pnwisa.org/tree-care/damage/protecting-trees-from-damage/

Critical Root Zone Protection

A critical step in retaining healthy trees is the protection of tree roots from disturbance. Each tree has a critical root zone (CRZ) that varies by species and site conditions. The International Society of Arboriculture defines CRZ as an area equal to a 1-foot radius from the base of the tree's trunk for each 1 inch of the tree's diameter at 4.5 feet above grade (referred to as diameter at breast height).

Another common rule of thumb is to use a tree's drip line to estimate the CRZ (see figure). Evaluate both of these and choose whichever provides the larger CRZ.

Under certain circumstances, disturbing or cutting roots in a CRZ may be unavoidable. In such cases, the work should be done only under the on-site supervision of an ISA Certified Arborist.

Cutting or disturbing a large percentage of a tree's roots increases the likelihood of the tree's failure or death. Never cut tree roots that are more than four inches wide; roots that large are usually structural. Cutting them can destroy the stability of the tree, causing it to fall over!

If you must cut tree roots, do so cleanly with sharp tools. Never tear with a backhoe or other dull instrument. A clean cut encourages good wound closure and confines the spread of decay. If damage is severe, consider removing the tree because its stability may have been compromised.

Activities to Avoid in the Critical Root Zone

The CRZ that should be protected from negative interactions. Avoid the following activities:

- Stockpiling construction materials or demolition debris
- Parking vehicles or equipment
- Piling soil and/or mulch
- Trenching for utilities installation or repair, or for irrigation system installation
- Changing soil grade by cutting or filling
- Damaging roots by grading, tearing, or grubbing
- Compacting soil with equipment, vehicles, material storage, and/or foot traffic

- Contaminating soil from washing out equipment (especially concrete) and vehicle maintenance
- Installing impervious parking lots, driveways, and walkways
- Attaching anything to trees using nails, screws, or spikes
- Wounding or breaking tree trunks or branches through contact with vehicles and heavy equipment
- Wounding trunks with string weed trimmers and lawn mowers
- Causing injury by fire or excessive heat

During Construction

Monitor compliance with tree protection requirements and the impacts of construction activities on tree health regularly during construction. If there are incursions into the root zone, ensure roots have been severed cleanly, enforce penalties, and reestablish the protection zone. Confer with your contractors to make sure that construction offices, vehicular parking, worker break sites, concrete washout areas or other pollutants, and material storage will remain outside of protected areas. Diligence in maintaining barriers and in enforcing your protection plan will pay great dividends at the end of the project when the tree is still healthy.

Following the guidelines laid out above will serve in most situations, but occasionally construction plans will require impingement on the CRZ.

Trenching

Trenching is a standard way to install utilities. **It is best to entirely avoid trenching through the CRZ** (see figure); such practice could severely destabilize a tree, as well as adversely affect its health through loss of roots. Workers performing such operations should understand that 85% of the mass of a tree's root system is located within the CRZ and that most of a tree's roots are within the top 18 inches of soil. Alter routes of underground infrastructure or use alternate methods such as pipe boring. Tunneling at least 18 inches beneath the root zone will prevent loss of critical root mass if underground utilities must unavoidably be placed within the CRZ.

A decision must be made as to where best to locate utility trenches. Planners and designers must be made aware that trenches may not cross a CRZ and design alternate alignments accordingly; such realignments are not the responsibility of the construction crew.

Best practices for trenching include the following:

- Protect the trunks of high-value trees from scraping and gouging to a height of at least eight feet.
- Keep equipment and excavated backfill on the side furthest from the tree, not against the trunk.

- Place excavated backfill on a plastic or canvas tarp outside the CRZ.
- Prune away jagged roots back to the trench wall closest to the tree. Use a handheld pruner or pruning saw to make sharp, clean cuts.
- Replace the backfill on the same day if at all possible. Cover exposed roots with wet burlap to prevent them from drying out; in hot dry conditions, small roots may be injured in as little as 30 minutes.
- Do not allow chemicals, trash, or other foreign debris to become mixed with the backfill.
- If earthwork specifications allow it, firm the backfill to the same compaction as the surrounding soil and no more.
- Water the backfill to prevent excessive root drying.

Grade or Ground Level Changes

Grade changes should be avoided in order to prevent serious damage or death to a tree. Fill that is added over existing soils can smother and kill roots, or invite disease if piled around the trunk. Even temporary fills such as stockpiling mulch or soil in the CRZ of a tree for as little as several days during the construction process can have severe, long-term negative effects, though symptoms may not appear for several years.

The extent of injury from adding soil around a tree varies with the kind, age, and condition of the tree; the depth and type of fill; drainage; and several other factors. Maple, oak, and evergreens are most susceptible, while elm, ash, willow, sycamore, and locust are least affected.

Little can be done to save trees that have been suffering from soil added over an extended period of time. It is prudent to consider possible damage that may occur to a tree and take alternative action before the fill is made; prevention is less expensive and more effective than attempting to correct the situation after damage has been done.

Best practices for fill operations include the following:

- Never place any fill or organic materials directly against the tree.
- Never compact the soil within the CRZ.
- If using no more than two to four inches of fill around existing trees, significant damage may be avoided if the fill has a coarser texture than the existing soil.

Less damage to a tree's roots is likely with a lowered grade than when it is raised, unless exposing or removing a great deal of the root mass. A general rule-of-thumb used by landscape architects is to remove no more than six inches of soil from the existing grade in the CRZ; however, this is dependent on the soils in which the tree is growing. A tree's roots may all exist in the top foot of a shallow soil; removing the top six inches would have tremendous negative impact in that case.

Best practices for removing soil include the following:

- Consider removal and replacement if the tree is young, in poor condition, an undesirable species, or very susceptible to insects and disease.
- Plan grade changes well in advance of construction using the appropriate method to prevent injury to desirable trees.
- Use retaining walls or terraces to avoid excessive soil loss in the area of greatest root growth.
- Spread mulch over the exposed root area when possible, to help prevent soil erosion, reduce moisture loss, and keep soil temperatures lower.
- Provide supplementary water when rainfall is less than one inch per week.
- Prune roots to prepare the tree for root loss due to grade lowering. Root pruning is best left to an ISA Certified Arborist, who can take into account the variables necessary to reduce the stress of the pruning to the tree.

10. Certificate of Performance

I, Andy Crossett, certify that:

- I have personally inspected the trees and the property referred to in this report and have stated my findings accurately.
- I have no current or prospective interest in the vegetation or the property that is the subject of this report and have no personal interest or bias with respect to the parties involved.
- The analysis, opinion, and conclusions stated herein are my own and are based on current industry standards, scientific procedures, and facts.
- My analysis, opinion, and conclusions were developed, and this report has been prepared according to commonly accepted arboriculture practices.
- No one provided significant professional assistance to me, except as indicated within the report.
- My compensation is not contingent upon the reporting of predetermined conclusion that favors the cause of the client or any other party nor upon the results of the assessment, the attainment of stipulated results, or the occurrence of any subsequent events.

I further certify that I am a member in good standing of the International Society of Arboriculture (ISA) and an ISA Certified Arborist (#PN-7375A) and Tree Risk Assessment Qualified. I also am a Certified Professional Horticulturist through the Washington State Nursery and Landscape Association.

If you have any questions about this report, please contact me at 206-310-8254 or andycrossett@hotmail.com.

Andy Crossett

References:

Dirr, Michael A. *Manual of Woody Landscape Plants Their Identification, Ornamental Characteristics, Culture, Propagation, and Use.* Stripes Publishing L.L.C., 2009

Smiley, E. Thomas, Nelda Matheny, and Sharon Lilly. *Tree Risk Assessment (Best Management Practices, Second Edition)*. Champaign: International Society of Arboriculture, 2017.

Dunster, Julian A., E. Thomas Smiley, Nelda Matheny, and Sharon Lilly. Tree Risk Assessment Manual. Champaign, Illinois: International Society of Arboriculture, 2013.

Shigo, Alex L. *A New Tree Biology: Facts, Photos, and Philosophies on Trees and Their Problems and Proper Care*. Shigo and Trees, Associates, 1986.

11. Credentials & Experience

History

I first began working in the horticulture industry in 2002 at a landscaping company located locally in Bellevue, WA. After working in the field for a few years, as a laborer and a supervisor, I decided to pursue a formal education at Lake Washington Institute of Technology. I graduated in 2011 with a degree in Environmental Horticulture and immediately took the ISA and CPH exams to be become a Certified Arborist and a Certified Horticulturist, respectively. I moved onto to work as a member of the Street Tree and Irrigation Department for the City of Bellevue. Tree Frog LLC started in 2013, when I began consulting part time in addition to working as head gardener at a seven-acre estate in Medina, WA. Tree Frog LLC has grown, and I have been consulting full time since 2017.

In my spare time, I enjoy spending time with my family and the animals on my small hobby farm.

Education

Lake Washington Institute of Technology – Associates Degree, Environmental Horticulture

My education from Lake Washington Institute of Technology's horticulture program focused on the following areas of study: botany, plant propagation, greenhouse management, soils, pruning, pest and disease management, landscape design, turf grass management, and plant identification.

Credentials

Certified Professional Horticulturist through the Washington State Nursery & Landscape Association #2537

In 1978, WSNLA created a two-pronged professional certification program that was known as the Washington Certified Nurseryman or Washington Certified Landscaper. In 2005, WSNLA revamped and upgraded the certification program and renamed the designation as Certified Horticultural Professional. With nearly 400 Certified Professional Horticulturists, the CPH program is the largest community of state certifications serving professional horticulturists in Washington State.

To earn a WSNLA Certified Professional Horticulturist credential, you must pass a written exam that tests your skills and knowledge as a horticultural professional based on study materials and practical applications.
You must provide the equivalent of one year of work experience (2000 hours) with a licensed nursery, landscape contractor or WSNLA-approved business or institution.

Certified Arborist and Qualified Tree Risk Assessor, through the International Society of Arboriculture #PN-7375A.

To earn an ISA Certified Arborist® credential, you must be trained and knowledgeable in all aspects of arboriculture. ISA Certified Arborist® have met all requirements to be eligible for the exam, which includes three or more years of full-time, eligible, practical work experience in arboriculture and/or a degree in the field of arboriculture, horticulture, landscape architecture, or forestry from a regionally accredited educational institute. This certification covers a large number of topics giving the candidates flexibility in the arboricultural profession. A code of ethics for ISA Certified Arborists® strengthens the credibility and reliability of the work force. This certification is accredited by the American National Standards Institute, meeting, and exceeding ISO 17024.

Continued Education

Trees and the Law **|** Report Writing for Arborists **|** Defensible Tree Appraisal **|** Developing Field Assessment Skills for Common PNW Tree Diseases **|** Climbing Safety Case Studies **|** WSNLA PROseries seminar Pest & Disease **|** Tree Disorder Diagnosis Online Workshop & Live Discussion **|** Why Trees Fail Online Workshop & Live Discussion **|** Arbor Chat: A Deep Dive Into the ISA Certified Arborist® Code of Ethics **|** Diagnosis & Disorder: General Diagnosis **|** Tree Biology: Anatomy **|** Arbor Chat - Coronet cuts: The simulation of natural fractures **|** Tree root physiology and urban soils – can't we just all get along? **|** Arboricultural Zombies - Myths That Will Not Die **|** Forged in Fire: Arborist Options Before & After the Fire **|** Forest Health Watch – working together to monitor, study and understand tree health issues in Pacific Northwest **|** Tree insect pest diagnosis and management **|** Homeowner knowledge and perceptions of tree care and preservation on residential properties **|** Managing the Trees Where People Live for Resiliency **|** Regenerative Pruning: Research on Overextended Trees, Practice on Hollow Trees **|** Machine Generated Report Writing **|** Tools We Use **|** Putting the MD Back in Tree Doctor **|** Building a Resilient Arboriculture and Urban Forestry Program in Rural Municipalities **|** Ethical Tree Care in the Urban Interface **|** What's pesky in the PNW… And what could be on its way? **|** Coping with heat: Community urban forest perspectives and experiences in Vancouver, Canada **|** Advancing Urban Forestry in the Pacific Northwest **|** Root Pruning **|** The Influence of Abiotic Factors on Street Tree Condition and Mortality in a Commercial-Retail Streetscape **|** Arborists and Wildlife: Retaining Trees for Wildlife Habitat **|** Tree Inventories **|** Biology and Identification of Fungi **|** Wood Decay Fungi Identification and Management **|** Container Type Affects Root Development **|** Tree Lightning Protection Systems **|** Advanced Tree Identification **|** Wood Chips and Compost Improve Soil Quality and Increase Growth of Acer rubrum and Betula nigra in Compacted Urban Soil **|** A Review of Spatial Variation of Allergenic Tree Pollen **|** The Cost of Not Maintaining the Urban Forest **|** Impacts of Wire Basket Retention and Removal **|** Effects of Root Severance by Excavation on Two Urban Tree Species

Volunteering

Dog Mountain Farm, CSA

Dog Mountain Farm serves the Snoqualmie Valley community and Seattle area by providing Certified Naturally Grown farm-fresh vegetables, fruit, eggs, herbs, and flowers. They also offer educational tours for schools and groups.

12. Assumptions & Limiting Conditions

a) A field examination of the site was made on **8/24/2022**. My observations and conclusions are as of that date.

b) Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible; however, the consultant/arborist can neither guarantee nor be responsible for accuracy of information provided by others.

c) Unless stated otherwise: 1) information contained in this report covers only those trees that were examined and reflects the conditions of those trees at the time of inspection; and 2) the inspection is limited to visual examination of the subject trees without dissection, excavation, probing, or coring. There is no warranty or guarantee, expressed or implied that problems or deficiencies of the subject tree may not arise in the future.

d) All trees possess the risk of failure. Trees can fail at any time, with or without obvious defects, and with or without applied stress. A complete evaluation of the potential for this (a) tree to fail requires excavation and examination of the base of the subject tree. Permission of the current property owner must be obtained before this work can be undertaken and the hazard evaluation completed.

e) Other trees with similar defects are standing in the neighborhood and have been so for some time. Trees are living biological organisms, and I cannot predict nor guarantee their stability or failure.

f) Sketches, drawings, and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural report of surveys unless expressed otherwise. The reproduction of any information generated by architects, engineers, or other consultants on any sketches, drawings, or photographs is for the express purpose of coordination and ease of reference only. Inclusion of said information on any drawings or other documents does not constitute a representation by Tree Frog LLC as to the sufficiency or accuracy of said information.

g) The consultant/appraiser shall not be required to give testimony or attend court because of this report unless subsequent contractual arrangements are made.

h) Loss or alteration of any part of this report invalidates the entire report.

i) Unless required by law otherwise, possession of this report or a copy thereof does not imply right of publication or use for any purpose by any other than the person to whom it is addressed, without the prior expressed written or verbal consent of the consultant/appraiser.

Appendix D

WWHM Report

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	22679 WWHM
Site Name:	Front Street S Short Plat
Site Address:	953 front st s
City:	issaquah
Report Date:	12/8/2022
Gage:	Seatac
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	1.333
Version Date:	2021/08/18
Version:	4.2.18

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Forest, Mod	0.37
Pervious Total	0.37

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.37

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Lawn, Mod	0.12
A B, Lawn, Flat	0.09
A B, Forest, Flat	0.06
Pervious Total	0.27

Impervious Land Use	acre
ROOF TOPS FLAT	0.02
DRIVEWAYS MOD	0.08
Impervious Total	0.1
Basin Total	0.37

Element Flows To:

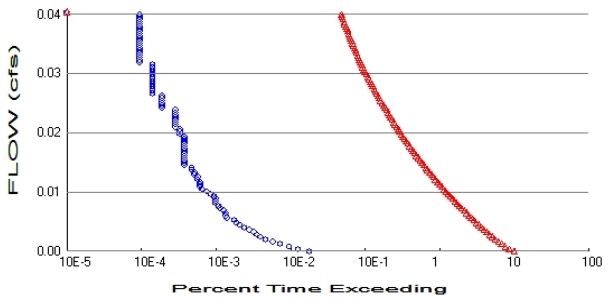
Surface	Interflow	Groundwater

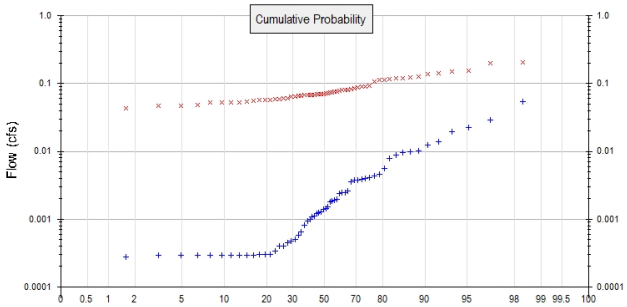
Routing Elements
Predeveloped Routing

Mitigated Routing

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.37
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.27
Total Impervious Area: 0.1

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.001439
5 year	0.005039
10 year	0.010111
25 year	0.021939
50 year	0.036837
100 year	0.059422

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.074904
5 year	0.103761
10 year	0.12525
25 year	0.155241
50 year	0.17973
100 year	0.206133

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1949	0.001	0.117
1950	0.020	0.120
1951	0.004	0.076
1952	0.001	0.047
1953	0.000	0.047
1954	0.004	0.071
1955	0.001	0.060
1956	0.009	0.070
1957	0.001	0.079
1958	0.002	0.053

1959	0.001	0.053
1960	0.005	0.070
1961	0.002	0.068
1962	0.000	0.042
1963	0.002	0.074
1964	0.006	0.065
1965	0.001	0.090
1966	0.001	0.053
1967	0.014	0.119
1968	0.004	0.091
1969	0.002	0.058
1970	0.000	0.068
1971	0.002	0.069
1972	0.012	0.113
1973	0.000	0.043
1974	0.001	0.083
1975	0.003	0.080
1976	0.004	0.066
1977	0.000	0.054
1978	0.000	0.073
1979	0.000	0.087
1980	0.000	0.138
1981	0.000	0.061
1982	0.002	0.124
1983	0.000	0.068
1984	0.001	0.057
1985	0.000	0.056
1986	0.000	0.066
1987	0.004	0.076
1988	0.000	0.053
1989	0.000	0.081
1990	0.029	0.203
1991	0.010	0.156
1992	0.000	0.057
1993	0.000	0.058
1994	0.000	0.048
1995	0.008	0.058
1996	0.022	0.113
1997	0.004	0.086
1998	0.002	0.071
1999	0.010	0.150
2000	0.000	0.080
2001	0.000	0.069
2002	0.002	0.074
2003	0.001	0.107
2004	0.001	0.126
2005	0.000	0.065
2006	0.004	0.068
2007	0.055	0.198
2008	0.010	0.143
2009	0.001	0.092

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0547	0.2031
2	0.0293	0.1978
3	0.0224	0.1560

4	0.0196	0.1505
5	0.0137	0.1434
6	0.0122	0.1377
7	0.0103	0.1256
8	0.0099	0.1235
9	0.0096	0.1198
10	0.0089	0.1194
11	0.0079	0.1173
12	0.0056	0.1134
13	0.0046	0.1126
14	0.0043	0.1068
15	0.0041	0.0917
16	0.0039	0.0912
17	0.0039	0.0896
18	0.0037	0.0873
19	0.0037	0.0862
20	0.0036	0.0828
21	0.0026	0.0811
22	0.0025	0.0803
23	0.0024	0.0798
24	0.0024	0.0787
25	0.0020	0.0764
26	0.0019	0.0761
27	0.0019	0.0740
28	0.0018	0.0737
29	0.0015	0.0729
30	0.0014	0.0710
31	0.0014	0.0708
32	0.0013	0.0703
33	0.0012	0.0698
34	0.0012	0.0693
35	0.0011	0.0685
36	0.0011	0.0685
37	0.0010	0.0677
38	0.0009	0.0676
39	0.0008	0.0675
40	0.0007	0.0663
41	0.0006	0.0655
42	0.0005	0.0649
43	0.0005	0.0646
44	0.0004	0.0605
45	0.0004	0.0600
46	0.0004	0.0585
47	0.0003	0.0583
48	0.0003	0.0581
49	0.0003	0.0571
50	0.0003	0.0566
51	0.0003	0.0561
52	0.0003	0.0540
53	0.0003	0.0532
54	0.0003	0.0532
55	0.0003	0.0531
56	0.0003	0.0527
57	0.0003	0.0479
58	0.0003	0.0472
59	0.0003	0.0467
60	0.0003	0.0429
61	0.0002	0.0424

Appendix E

Operations and Maintenance Manual

Table V-A.5: Maintenance Standards - Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%. Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe. Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height. Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No Trash or debris located immediately in front of catch basin or on grate opening. No trash or debris in the catch basin. Inlet and outlet pipes free of trash or debris. No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into basin). Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	Top slab is free of holes and cracks. Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound. Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Basin replaced or repaired to design standards. Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening. Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation blocking opening to basin. No vegetation or root growth present.
	Contamination and Pollution	See Table V-A.1: Maintenance Standards - Detention Ponds	No pollution present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Cover/grate is in place, meets design standards, and is secured
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place, meets the design standards, and is installed and aligned with the flow path.

Table V-A.17: Maintenance Standards - Coalescing Plate Oil/Water Separators

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Monitoring	Inspection of discharge water for obvious signs of poor water quality.	Effluent discharge from vault should be clear with no thick visible sheen.
	Sediment Accumulation	Sediment depth in bottom of vault exceeds 6-inches in depth and/or visible signs of sediment on plates.	No sediment deposits on vault bottom and plate media, which would impede flow through the vault and reduce separation efficiency.
	Trash and Debris Accumulation	Trash and debris accumulated in vault, or pipe inlet/outlet, floatables and non-floatables.	Trash and debris removed from vault, and inlet/outlet piping.
	Oil Accumulation	Oil accumulation that exceeds 1-inch at the water surface.	Oil is extracted from vault using vactoring methods. Coalescing plates are cleaned by thoroughly rinsing and flushing. Should be no visible oil depth on water.
	Damaged Coalescing Plates	Plate media broken, deformed, cracked and/or showing signs of failure.	A portion of the media pack or the entire plate pack is replaced depending on severity of failure.
	Damaged Pipes	Inlet or outlet piping damaged or broken and in need of repair.	Pipe repaired and or replaced.
	Baffles	Baffles corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection person.	Baffles repaired or replaced to specifications.
	Vault Structure Damage - Includes Cracks in Walls, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2-inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound. Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound. Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.
	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Ladder replaced or repaired and meets specifications, and is safe to use as determined by inspection personnel.

Table V-A.18: Maintenance Standards - Catch Basin Inserts

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Sediment Accumulation	When sediment forms a cap over the insert media of the insert and/or unit.	No sediment cap on the insert media and its unit.
	Trash and Debris Accumulation	Trash and debris accumulates on insert unit creating a blockage/restriction.	Trash and debris removed from insert unit. Runoff freely flows into catch basin.
	Media Insert Not Removing Oil	Effluent water from media insert has a visible sheen.	Effluent water from media insert is free of oils and has no visible sheen.
	Media Insert Water Saturated	Catch basin insert is saturated with water and no longer has the capacity to absorb.	Remove and replace media insert
	Media Insert-Oil Saturated	Media oil saturated due to petroleum spill that drains into catch basin.	Remove and replace media insert.
	Media Insert Use Beyond Product Life	Media has been used beyond the typical average life of media insert product.	Remove and replace media at regular intervals, depending on insert product.

Table V-A.19: Maintenance Standards - Media Filter Drain (MFD)

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Sediment accumulation on grass filter strip	Sediment depth exceeds 2 inches or creates uneven grading that interferes with sheet flow.	Remove sediment deposits on grass treatment area of the embankment. When finished, embankment should be level from side to side and drain freely toward the toe of the embankment slope. There should be no areas of standing water once inflow has ceased.
	No-vegetation	Flow spreader is uneven or clogged so that flows are not uniformly distributed over entire embankment width.	Level the spreader and clean to spread flows evenly over entire embankment width.

Table V-A.6: Maintenance Standards - Debris Barriers (e.g., Trash Racks)

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris	Trash or debris that is plugging more than 20% of the openings in the barrier.	Barrier cleared to design flow capacity.
Metal	Damaged/ Missing Bars.	Bars are bent out of shape more than 3 inches. Bars are missing or entire barrier missing. Bars are loose and rust is causing 50% deterioration to any part of barrier.	Bars in place with no bends more than 3/4 inch. Bars in place according to design. Barrier replaced or repaired to design standards.
	Inlet/Outlet Pipe	Debris barrier missing or not attached to pipe	Barrier firmly attached to pipe

Table V-A.7: Maintenance Standards - Energy Dissipators

Maintenance Components	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
External:			
Rock Pad	Missing or Moved Rock	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil.	Rock pad replaced to design standards.
	Erosion	Soil erosion in or adjacent to rock pad.	Rock pad replaced to design standards.
Dispersion Trench	Pipe Plugged with Sediment	Accumulated sediment that exceeds 20% of the design depth.	Pipe cleaned/flushed so that it matches design.
	Not Discharging Water Properly	Visual evidence of water discharging at concentrated points along trench (normal condition is a "sheet flow" of water along trench). Intent is to prevent erosion damage.	Trench redesigned or rebuilt to standards.
	Perforations Plugged.	Over 1/2 of perforations in pipe are plugged with debris and sediment.	Perforated pipe cleaned or replaced.
	Water Flows Out Top of "Distributor" Catch Basin.	Maintenance person observes or receives credible report of water flowing out during any storm less than the design storm or its causing or appears likely to cause damage.	Facility rebuilt or redesigned to standards.
	Receiving Area Over-Saturated	Water in receiving area is causing or has potential of causing landslide problems.	No danger of landslides.
Internal:			
Manhole/Chamber	Worn or Damaged Post, Baffles, Side of Chamber	Structure dissipating flow deteriorates to 1/2 of original size or any concentrated worn spot exceeding one square foot which would make structure unsound.	Structure replaced to design standards.
	Other Defects	See Table V-A.5: Maintenance Standards - Catch Basins	See Table V-A.5: Maintenance Standards - Catch Basins

Table V-A.8: Maintenance Standards - Typical Biofiltration Swale

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Recommended Maintenance to Correct Problem
General	Sediment Accumulation on Grass	Sediment depth exceeds 2 inches.	Remove sediment deposits on grass treatment area of the bio-swale. When finished, swale should be level from side to side and drain freely toward outlet. There should be no areas of standing water once inflow has ceased.
	Standing Water	When water stands in the swale between storms and does not drain freely.	Any of the following may apply: remove sediment or trash blockages, improve grade from head to foot of swale, remove clogged check dams, add underdrains or convert to a wet biofiltration swale.
	Flow spreader	Flow spreader uneven or clogged so that flows are not uniformly distributed through entire swale width.	Level the spreader and clean so that flows are spread evenly over entire swale width.